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ABSTRACT

Major research findings about student learning styles and implications for improving college and university teaching and the impact that instructional change has on college administration of instructional programs are addressed. The term "learning style" refers to a student's consistent way of responding and using stimuli in the context of learning. In the section on learning styles, Charles S. Claxton examines three dimensions of cognitive styles (field dependence-independence, reflection-impulsivity and preceptive-receptive/intuitive), three models of student response styles (described by Mann and others, Grasha and Riechmann, and Stern), and three integrated models (use of the Myers-Briggs Type Indicator, the Kolb model, and cognitive style mapping). In the second section on the use of information on student learning styles, Yvonne Ralston explores the following possible implementation approaches: sharing knowledge about learning styles with students, the teachers' efforts to provide a variety of instructional modes that are consistent with the styles of students, and the use of learning style information at the institutional level. Suggestions for establishing a plan, program coordination, and assumptions regarding the appropriate implementation system for the institution as a totality are presented. A bibliography is included. (SW)

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Learning Styles: Their Impact on Teaching and Administration

Charles S. Claxton and Yvonne Ralston

AAHE-ERIC/Higher Education
Research Report No. 10
1978

U.S. DEPARTMENT OF HEALTH,
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Foreword

A fair amount of research has been conducted concerning the impact of different teaching techniques on the learning process. Evaluating the benefits of the lecture method versus small-group discussion has long been the focus of many dissertations. More recently, researchers have turned their attention to newer teaching methods, such as personalized systems of instruction, contract learning, and computer-assisted or managed instruction. For the most part this research has neglected the second and equally important part of the teaching-learning process: how a person learns.

How a person learns and the manner information is most effectively and efficiently absorbed differs greatly from individual to individual. The problem is how can learning styles be identified and how can they be related to teaching styles. Charles S. Claxton, associate professor, Department of Curriculum and Instruction at the Center for the Study of Higher Education and Yvonne L. Ralston, assistant professor of Educational Administration and Supervision, Memphis State University, have thoroughly examined the learning-style research literature.

As a result of this analysis, the authors have developed a two-part monograph. In Part I, Dr. Claxton describes several models of learning styles that have been developed by writers in the field, and suggests some of the major implications these models have for improving college and university teaching. In Part II, Dr. Ralston turns to the question that is often ignored in discussions of instructional improvement: the impact that instructional change has on how the college is administered. This discussion is based on the belief that while research on student learning styles is promising, only minor changes can occur in instruction unless there are accompanying changes in how the instructional program is administered. Dr. Ralston examines some of these changes from three perpectives: that of the student, the teacher in the classroom, and the institution as a whole. She also reviews assumptions behind the establishing of an implementation plan for the use of learning styles in the college setting.

This report, along with the Research Report *To Improve Instruction* by Charles C. Cole (No. 2 / 1978), should provide an excellent foundation for those wishing to learn about increasing the impact of the teaching-learning process.

Jonathan D. Fife, Director
ERIC Clearinghouse on Higher Education

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Overview

In the past several years there has been extensive research on various approaches to college teaching, but no one approach, or method, has been found to be consistently superior to all others. However, that may only be showing that no one approach is superior for the mythical average student. The more important question is to determine which students learned best under what conditions. An emerging area of research that holds promise in helping us answer this question is student learning styles. The term "learning styles" refers to a student's consistent way of responding and using stimuli in the context of learning.

Models of Learning Style

Of the numerous models of cognitive style identified by researchers, the one that has been the focus of the most research is field dependence. Witkin (1976) states that field dependent persons view the world in a more global, gestalt way, while field independent persons see things in a more analytic way. Field dependent people learn material more easily if it has social content; they favor people-oriented vocations, such as social service and education, and they are more affected by criticism. Field independent people, in contrast, are less sensitive to social cues, favor more theoretical vocations, such as engineering and mathematics, and are not particularly affected by criticism.

When students and teachers are matched according to field dependence-independence, they tend to regard each other more positively. People become aware of others' orientations very quickly, and Witkin suggests that by the end of the first class period students and teachers may be aware, at least at an unconscious level, of each other's styles.

Mann and others have found they can group students into eight categories, according to response style (1970):

(1) Compliant students, who adapt themselves to the will of authorities;

(2) Anxious-dependent students, who depend on the teacher for knowledge and support;

(3) Discouraged students, who are dissatisfied with themselves and have a pervasive feeling of guilt;

(4) Independent students, who are very intelligent, secure and comfortable;

(5) "Heroes," who feel rebellious and superior and see themselves as exceptional persons;

(6) "Snipers," who are much like "heroes" but their rebelliousness is more defensive;

(7) Attention seekers, who have a predominantly social orientation and are frequently involved in jokes, talking and showing off;

(8) Silent students, who have a tremendous sense of helplessness and vulnerability.

Reichmann and Grasha (1974) developed a scale in which they identified six learning styles similar to those identified by Mann: independent, dependent, collaborative, competitive, participant and avoidant.

Kolb (1978) has described a theory of experiential learning made up of four phases: concrete experience, reflective observation, abstract conceptualization and active experimentation. He has identified four types of learning styles, each with a dominant learning mode explicit in the theory. The first are convergers, persons who work best when there is a simple, correct answer to a problem. Convergers move quickly to find the correct answer when presented with a question or a task. Their dominant learning abilities are abstract conceptualization and active experimentation.

Divergers are the opposite of convergers and their major learning orientations are concrete experience and reflective observation. Their strength is in their imaginative ability. They are called divergers because they are good at generating ideas and brainstorming. They tend to be people-oriented and emotional.

Assimilators are persons whose dominant learning orientation is abstract conceptualization and reflective observation. They are good at creating theoretical models; they are called assimilators because they like to assimilate diverse items into an integrated whole.

Accommodators prefer learning through concrete experience and active experimentation. They like to take risks and they focus on doing things and having new experiences.

This array of research findings on student learning styles, briefly touched on here, has some very important and practical implications for persons concerned about effective teaching in colleges and universities. First, the findings underscore a fundamental fact of teaching and learning—students learn in different ways. The corollary is that teachers have particular teaching styles as well. Second, student learning styles can be identified, and there are now tools available to help us do that. Third, the research on field dependence–field independence tells us that matching students and teachers on this dimen-

sion brings about greater interpersonal attraction. It would seem that matching (and the resulting increased interpersonal attraction) would lead to more effective learning.

A logical question to be raised is whether we should match students and faculty by learning and teaching styles. One could easily argue that we should do precisely the opposite, and thereby expose students to situations that would be new to them and which would seem to broaden their intellectual horizons. The answer to whether we should match or mismatch depends on the purpose of the learning activity. For example, the purpose may be purely *instrumental.* The student may wish to develop a particular skill, such as in computation or writing. In such a situation, matching seems called for. On the other hand, the purpose may be *developmental.* The student may wish to achieve greater personal flexibility and a greater sense of personal autonomy. Such objectives can more likely be achieved through discontinuity of learning experience, that is, through participation in endeavors that are not congruent with the student's learning style. In this way he is forced to make a stringent reappraisal of his attitudes and feelings.

Administration

The use of information on student learning styles can be viewed from three perspectives: use by the student as a means of helping him plan his education efforts; use by the individual classroom teacher; and use by the total institution.

The first, use by the student, begins with some means of assessing his learning style and sharing the results with him. Appropriate instruments could include the cognitive-style map (Hill and Nunnery), the Myers-Briggs Type Indicator (Myers), or the Learning Style Inventory developed by Kolb. These instruments point up the kinds of characteristics the student has as he learns. An instrument may reveal that he has a strong associative need and can learn most effectively through peer group interaction; or it may show that he can function in an individualized study mode with only occasional meetings with the teacher and the other students enrolled in the course. The student, armed with greater knowledge about how he learns, is in a better position to structure his educational endeavors.

A second way information on learning styles can be used is by the individual teacher in the classroom. With only a modest amount of time and energy, the teacher can assess his students' learning styles and then provide a variety of instructional modes in the course that are consistent with the styles of his students. A particularly helpful

approach to use in doing this is an individualized learning contract. After student learning styles have been assessed and the results shared with the students, the teacher can assist them in developing contracts in which they identify objectives they wish to achieve in the course and the activities they will engage in to accomplish those objectives. Describing the activities they will undertake is much more useful and relevant to the students when done in light of knowledge about their preferred learning styles.

The third way information on learning styles can be used is far more involved and complex than the preceding ones: an institutional approach to students' learning styles. It takes into account individual student learning styles and implies the analysis and reorganization of staff, facilities, and resources of an institution.

There is little in the literature about how to organize an institution's instructional program so as to offer alternative instructional paths consistent with students' varied learning styles. Yet there is enough in the literature about administrative theory, institutional change, and individualized instruction to allow us to identify key factors that must be dealt with to implement instructional programs that fully use information on student learning styles:

- Resources must be marshalled to accomplish preparation of materials, including not only the outlining of objectives, but also the mundane (yet vital) job of typing, duplicating, and distributing materials.
- There may need to be a reorganization of space in the institution to accommodate various modes of instructional delivery, such as independent study, seminars, medium-size group instruction, large-size group instruction, and space for individual student-teacher conferences.
- Staffing patterns need to be reexamined and other arrangements, such as differentiated staffing and the use of para-professionals, may need to be implemented.
- The scheduling of classes may need to be revamped, since successful learning for all students does not occur in the same length of time or in the same way.
- Academic advising will take on a new dimension. It becomes not just a matter of selecting courses but also of helping students select particular sections taught in particular ways so that students can enroll in those courses that relate to their learning styles.
- The reward system must be reviewed to ensure that it is geared to rewarding faculty and staff to participate in the changes called for in this type of instructional program.

- There has to be appropriate management development to assist those in leadership positions in organizing the support and expertise needed to carry out the instructional program effectively.
- Finally, there must be adequate fiscal support to plan, implement, and sustain the changes needed in the institution.

In weighing the pros and cons of using the institutional approach to different styles of learning, the effort is certainly complex and difficult in terms of time, costs, and frustration. The students and teacher approaches are seemingly less complex for implementation. No matter which approach is used, there will be substantial impact on other parts of the institution.

It should be remembered that existing interactions and influencing networks within colleges and universities have traditionally been disjointed. Loosely joined federations within these educational organizations act as barriers to total system change and create climates that produce conflict rather than supportive, participatory, democratic environments. What is needed are skillful and able educational administrators and leaders who can join and link the groups together for accomplishment of educational change.

Part I: Learning Styles

Introduction

President Chester Arthur once remarked that his idea of good teaching was "Mark Hopkins sitting on one end of a log and a student on the other." Although in more recent years Robert M. Hutchins of the University of Chicago termed that story "nauseating," this bucolic scene of the teacher and the student exchanging ideas is still the ideal image that comes to people's minds when they think about teaching and learning. Strong and sustained efforts at instructional change have taken place during the past several decades. Lecture, discussion, independent study, laboratories, media, personalized systems of instruction, seminars, computer-assisted instruction, programmed learning, simulations—all these and others have been employed and studied as teachers and researchers look for ways to improve the basic format of Hopkins and his student. But while certain approaches to teaching are found to be better for certain purposes, no one method has been found to be clearly superior to another (Shalock 1976; Trent and Cohen 1973).

As Cross has pointed out, however, to ask which approach is superior to another is to ask the wrong question (1976, p. 112). She notes that what research really tells us is that no one approach is superior for that mythical average student. When we take this approach we fail to see which students learned best under what conditions. That is the information that gets lost when comparing, in gross, undifferentiated fashion, two instructional approaches. For example, student A is a mature, responsible person who learns by working independently. To have her sit through a series of lectures is to hold her to an approach and pace that may be comfortable for the teacher but which may have little to do with the student's needs and interests. Such a tack may cause her to be "turned-off" by the content of the course, when the opposite could easily have happened if the student had been able to use the learning style that was most productive for her. Student B, on the other hand, may be very unclear as to what he needs to learn, and can profit most from a highly structured set of lectures and similar learning activities designed by a competent and experienced college teacher.

To understand which students learn best under what conditions, it will be helpful to look carefully at an emerging area of research that

holds promise for improved college teaching—student learning styles. Learning styles have only recently begun figuring in the literature on teaching-learning in postsecondary education. Yet careful and systematic research on the topic has been going on for years, at least on selected aspects of how people learn. This paper presents the highlights of major research findings and explores several critical questions about learning styles and their potential use for improving college teaching.

Our approach is to examine the research on learning styles in three sections. The first is cognitive style as defined by psychologists, and here we present three dimensions of how people perceive and deal with stimuli. The second is what we have termed student response styles, since the three models presented are based on empirical observations of how students respond and interact in the classroom. The third is what we have called integrated models of learning styles, since the researchers in this area have drawn on learning theory, personality orientation, and individual development.

Cognitive Styles Defined

The term "learning styles" refers to a student's consistent way of responding to and using stimuli in the context of learning. The major portion of research on learning styles is on what are called "cognitive styles," which Witkin has defined as "cognitive characteristic modes of functioning that we reveal throughout our perceptual and intellectual activities in a highly consistent and pervasive way" (1976, p. 39). Vernon, after reviewing various uses of the term in the past several decades, gives a consensus definition as follows: cognitive style is "a superordinate construct which is involved in many cognitive operations, and which accounts for individual differences in a variety of cognitive, perceptual and personality variables" (1973, p. 141). Messick has stated that there are "several dimensions of individual differences in the performance of cognitive tasks that appear to reflect consistencies in the manner or form of cognition, as distinct from the context of cognition on the level of skill displayed in the cognitive performance." These dimensions are called "cognitive styles" and they "represent a person's typical modes of perceiving, remembering, thinking and problem solving" (1970, p. 188). ERIS has defined cognitive style as "Information processing habits which represent that learner's typical modes of perceiving, thinking, remembering, and problem solving" (Thesaurus . . . 1977, p. 34).

There are numerous models of cognitive styles identified by researchers. The following are adapted from Nelson (1978):

Model	Description	Key References
(1) Field dependent-independent	A global versus analytic way of perceiving. Entails the ability to perceive items without being influenced by the background.	Witkin and others (1954); Witkin (1976)
(2) Analytical-nonanalytic conceptualizing	Analytic style entails differentiating attributes or qualities. Nonanalytic style responses may be more relational or thematic.	Kagan and others (1960); Messick and Kogan (1963)
(3) Impulsivity-reflectiveness	Impulsivity is characterized by quick responses, reflectivity by more deliberate, slower responses. The impulsive person is quicker but makes more errors.	Kagan (1965)
(4) Risk taking-caution	Risk taking is characterized by taking risks even when the odds for success are poor. Caution is characterized by reluctance to take chances except when the probability of success is great.	Kogan and Wallach (1964)
(5) Preceptive/receptive-systematic/intuitive	The inclination to assimilate data into concepts, or precepts, previously held (preceptivity) versus the tendency to take in data in raw form (receptivity). The inclination to develop clear sequential plans (systematic) versus the tendency to develop ideas freely from data and to skip from the part to the whole (intuitive).	McKenney and Keen (1965)
(6) Leveling-sharpening	Individual variations in assimilation in memory. The leveler tends to assimilate new stimuli into previous categories, while the sharpener tends to differentiate new information from old.	Gardner (1959)
(7) Cognitive complexity-simplicity	Differences in tendency to see the world in a multidimensional way. Complexity is characterized by the use of hierarchic integration, while simplicity is shown in the use of dimensions of difference.	Harvey and others (1961); Kelly (1955)

Model	Description	Key References
(8) Scanning-focusing	Entails identification of relevant versus irrelevant information in attempting to solve a problem.	Schlesinger (1954)
(9) Constricted-flexible control	Constricted control shows more susceptibility to distraction; flexible control is characterized by resistance to interference.	Klein (1954)
(10) Broad-narrow	Preference for broad categories containing many items, rather than narrow categories containing few items.	Bruner and Tajtel (1961); Kogan and Wallach (1964); Pettigrew (1958)
(11) Tolerance for incongruous or unrealistic experiences	Individual willingness to accept perceptions which vary from the conventional experience. Tolerance is characterized by a greater adaptation to unusual perceptions. Intolerance is revealed by the demand for more data before the unusual is accepted.	Klein, Gardner, and Schlesinger (1962)

We can see from these models that there is great diversity as well as some interesting similarity in them. Field dependence-independence, with its emphasis on a gobal versus analytic way of perceiving, sounds somewhat like the nonanalytic versus analytic style of differentiating qualities or data. A person's tendency to be impulsive or reflective is rather like the inclination to be either a risk taker or to be cautious. The preceptive/receptive-systematic/intuitive dimension is rather like the leveling-sharpening tendency. And the person who has a nonanalytic response style and watches for relations in data is akin to the preceptive person who watches for patterns rather than the details as they are.

Substantive research has been done on each of these and other models of cognitive styles. But as Kogan has noted, until recently there has been "an almost total lack of articulation . . . between the psychological study of cognition, on the one hand, and educational research and practice, on the other" (1971, p. 243). Three of the cognitive style models listed above have been the object of research which relates directly to our present concern, college teaching, and they warrant a closer examination by us here. These are field depen-

dence-independence, impulsivity-reflectiveness and preceptive/receptive-systematic/intuitive.

Three Models of Cognitive Style

(1) *Field Dependence-Field Independence*—Without question the dimension that has been the object of the most study is field dependence-field independence. In 1954, Herman Witkin and his associates published *Personality Through Perception,* a report of several years of research, primarily on field dependence-independence. Since that time, they as well as a number of other researchers have reported numerous findings on this important dimension. At present, Witkin and his colleagues are carrying out a major longitudinal study of 1,600 students who graduated from a large municipal university in 1970. The researchers have extensive data on the students including information on majors, courses taken, grades, academic problems, interest inventories, personality tests, information from interviews, and, for the students who went to graduate school, institutional selection. Thus, the team of researchers is able to examine cognitive style and its relationship to a number of key academic factors.

The basic tools used to study individual differences along this dimension are the rod-and-frame test, the body-adjustment test and the embedded-figures test (Witkin 1976). In the rod-and-frame test, the subject is seated in a darkened room and shown a luminous rod situated in a luminous frame. The rod and frame can be adjusted independently, and the subject is asked to move the rod to the true vertical position while the frame is slanted. Some subjects adjust the rod to alignment with the frame (even when the frame is slanted to the left or to the right) and then say that the rod is upright. Other subjects adjust the rod to the upright position irrespective of the tilt of the surrounding frame.

In the body-adjustment test, the subject is seated in a chair inside a small, specially constructed room, both of which can be moved independently. The subject is then asked to adjust her body to the upright position. Some people adjust the body to the surrounding tilted room and then report they are sitting in an upright position. Others adjust the body to an upright position independently of the angle of the room.

In the embedded-figures test, the subject is shown a simple figure, such as a square or rectangle. She is then shown a more complex figure that has within it the first simple figure. The subject is then asked to find the simple figure within the complex figure. Some people

easily locate the simple figure in the complex one, while others have difficulty or are unable to do so in the time allowed.

While the embedded-figures test does not involve space orientation, as the first two do, the task is essentially the same—to perceive the object accurately without being influenced by the surrounding field. People tend to be consistent in their performance on all three tests (Witkin 1976, p. 41). Persons who are heavily influenced by the surrounding field are called field dependent; those who are relatively uninfluenced by the surrounding field are called field independent.

Field dependents and field independents differ not only in their perceptual ability in the laboratory but in their social interaction as well. Witkin states:

> . . . the person who, in the laboratory, is strongly influenced by the surrounding visual framework in his perception of an item with it is also likely, in social situations, to use the prevailing social frame of reference to define his attitudes, his beliefs, his feelings, and even his self-view from moment to moment. Thus, if you substitute for the square wooden frame a social frame of reference, and for the rod, an attribute of the self, such as an attitude or sentiment, there is indeed continuity in what a person is likely to do in both laboratory perceptual situations and social situations (1976, p. 43).

In 1976, Witkin published a major summary of the research done by him and other professionals in the field on field dependence-independence, and the following are the highlights of this summary. At the outset, we need to recognize that there are not two types of people in the world, field dependents and field independents. Rather, a person's standing on this dimension is described by her position relative to the mean.

Several studies are underway to determine the extent to which genetic factors such as sex chromosomes influence field dependence-independence. The conclusion emerging thus far is that genetic factors are no doubt important, although less so than socialization and child-rearing experiences.

It appears that the early experiences children have with their mothers are important; field-independent persons were encouraged at an early age to be autonomous. This finding has held in a number of cross-cultural studies of peoples as varied as Europeans, the Eskimo of Baffin Bay, and the Temme of Sierra Leone. Field dependents are strongly influenced by authority figures and by peer groups. They look at the faces of persons with whom they are interacting and they remember people's faces more. They are better than field independent people at remembering information that has social content. Field

dependent girls tend to wear clothes at a length that is more common in that setting, while girls who are field independent tend to wear clothes at different lengths. There are differences between field-dependent and field-independent persons in speech patterns. Field-dependent persons refer more to others than to themselves as they talk, while field independent persons use personal pronouns and active verbs more ("I did this" as opposed to "this happened to me"). People adjust their rate of speech to the rate of others, although field dependents do this more than field independents.

Studies in academic contexts have demonstrated that field dependence-independence is a significant variable in a student's selection of a major, courses, and career choice. Field-independent students clearly favor areas of study that call for analytic skills such as mathematics, engineering, and science. Field-dependent students favor areas that call for more extensive interpersonal relations, such as social science, the humanities, counseling, teaching, and sales. Also, field-dependent persons tend to select the fields chosen by their peer group.

Among graduate students in psychology the more field dependent chose clinical psychology, while the more field independent chose experimental psychology. Among high achieving students in nursing, the more field dependent chose psychiatric nursing, while the more field independent chose surgical nursing. Persons studying systems engineering were found to be more field independent than were engineers in other categories.

Women have been found to be more field dependent than men, although there is a great deal of overlap. Men tend to select careers that call for analytic skills, while women choose work that calls for more interaction with others. Women who are field independent tend to score at the masculine end of scales that measure masculinity-femininity.

Students who are field dependent have more difficulty making career choices, and they change majors more often than students who are field independent. Shifts from the math-science area are common, while shifts from social sciences-humanities are quite uncommon. Witkin speculates that this may be because the skills required in math-sciences are very specific analytical skills, while the skills needed in the social science-humanities are more broad-gauged. Field-independent students may be comfortable in social science-humanities as well as in math-science, but field dependents are only comfortable in social science-humanities. Some social science-humanities fields are broad enough to provide a congenial place for both field-dependent and

field-independent persons. For example, within psychology one could work in the experimental or clinical area. In education one could work in educational research or elementary education.

The presence of a field-dependent or field-independent style can be observed in the pre-college years. Although people tend to become more field independent as they grow older, their standing relative to other persons remains stable.

Almost no research has been done on the field dependence-independence dimension with college and university teachers. The little research that has taken place deals with elementary- and secondary-level teachers. These persons are more likely to be field dependent; this is not surprising, since teaching clearly calls for working intensely with other people. Math-science teachers are more likely to be field independent, while social science teachers are more likely to be field dependent. Field-dependent teachers prefer discussion methods of teaching, while more field-independent teachers prefer the lecture method. Field-independent teachers tend to be more direct in attempting to influence students, field-dependent teachers more inclined to employ democratic procedures in the classroom.

Field-dependent therapists make greater use of interpersonal relations with clients as a vehicle for therapy and interact more with clients. Field-independent therapists employ more directive and noninvolving, noninterpersonal approaches. Therapists choose more supportive counseling for field-dependent clients than for field-independent ones.

The evidence suggests that field-independent persons are influenced more by intrinsic motivation, but no differences have been found with regard to extrinsic motivation. Further, field-dependent persons are more affected by criticism with regard to their learning than field-independent persons.

When students and teachers were matched and mismatched in terms of field dependence-independence, the matched subjects described each other positively, the mismatched described each other negatively. When the teachers described their students' abilities, they valued more highly the attributes of students who were like themselves. Similarly, the students felt more positively about the teachers who were like themselves in terms of cognitive skills.

These findings held true when patients and therapists were tested in matched and mismatched dyads. The patients in matched dyads described their therapists' relations more positively than did those in mismatched dyads.

People apparently become aware of the styles of other people very

quickly: in one study, the effects were noted within an hour, and within 30 minutes in another.

To study interpersonal space as a function of field dependence-independence, subjects prepared a talk and then went into a room to present the talk to the experimenter, a task that was usually anxiety producing. Afterwards, the distance between the experimenter and the subject was measured. Field-dependent persons stood closer to the experimenter than the field-independent persons. This finding indicates in a very visible way the field-dependent person's need for closeness, particularly in a situation characterized by anxiety or discomfort.

What are some of the implications of this research? Witkin has concluded that matching students and teachers in terms of field dependence-independence brings about greater mutual attraction but notes that we do not yet know whether it brings about increased student learning. He suggests, further, that people apparently become aware of other people's style very quickly, and, hence, the way teachers and students view each other may be set by the end of the first class session. Because how people value and perceive each other varies as a function of their matching or mismatching, it may be too simplistic to speak of a "good" or "bad" teacher. Rather, we need to see that some teachers are probably good with certain students and less so with others, aside from their level of professional expertise and competence.

Wapner (1976) believes that people's field dependence or independence varies with the situation. He agrees that matching contributes to people liking each other but also questions whether that is best for learning. He suggests that it could well enhance the creative ability of a field-dependent person to place her in an unstructured, inner-directed learning environment.

Chickering (1974) notes that some students go through college relatively untouched by the experience while others are bowled over by it. The key is to find what conditions will have the greatest and most beneficial impact on students. The findings on the field dependence-independence dimension can be helpful to teachers and curriculum developers in this regard. Field-dependent persons have less of a sense of differentiation from others and from their environment and look for greater clarity of cues as they absorb new information. Material presented to them through books, lectures, or other means may have to be shown to have greater discontinuity and be revealed more obviously than that provided their field-independent peers. The field-independent student may receive far more structure

and details than she needs when presented with the same material through the same means.

Because field dependence-independence characteristics can be detected early, and are relatively stable through the years, this dimension can be useful as educators assist students through academic advising, career guidance, and program planning. Teachers and counselors can assist the student in self-understanding, in seeing the kinds of work that call for the skills she has, and in opening up new vistas on ways she might try to diversify her learning skills.

On the issue of matching or mismatching students and teachers, the key question is, What is the student's and teacher's purpose with regard to this particular learning endeavor? For example, it may be purely instrumental: the student may wish to improve her writing ability in order to avoid another "D" in theme writing. On the other hand, her purpose may be developmental: she may wish to achieve greater personal flexibility, to achieve a greater sense of personal autonomy, or to develop a clearer set of personal values about particular societal problems. Such objectives can more likely be achieved through discontinuity of learning experiences; that is, to participate in endeavors that are *not* congruent with her learning style and that force her to make a stringent reappraisal of her attitudes and feelings.

Knowing that field-dependent students are more subject to criticism can have an impact on teaching modes and on counseling approaches, particularly in areas where students are having difficulty. For example, higher education is plagued by student academic problems and attrition. More effective ways need to be found to reach and motivate poorly achieving students. Many such students are no doubt field dependent, and this research is telling us that firm encouragement can be far more helpful in working with these students than dispassionate, impersonal criticism.

(2) *Reflection-Impulsivity*—Reflection-impulsivity has been the object of a limited amount of research in the context of the classroom. Kagan (1965) has defined this dimension as "the tendency to reflect over alternative solution possibilities, in contrast with the tendency to make an impulsive selection of a solution, in problems with high response uncertainty" (p. 609). The tests used to determine this include the Matching Figures Test and the Identical Pictures Test. In the Identical Pictures Test the subject is to study a picture of an object (the standard), such as a geometric design, a house, or car. She is then shown several similar stimuli, only one of which is identical to the standard. The subject's task is to select the picture that

is the same as the standard. The subject has only a limited time span in which to respond to the test, which contains several items. Impulsive subjects respond to this factor of conceptual tempo by glancing quickly at the sample and selecting the answer that appears most nearly correct. The reflective person carefully examines each alternative before finally selecting what she believes is the correct one. While a person's reflectivity-impulsivity is relatively stable over time (Kagan 1965), research has shown that a persons' standing on this dimension can be changed. If an impulsive child is placed in a classroom with a reflective teacher, the child becomes more reflective (Nelson 1975).

In a study of 223, two-year and four-year college students, it was found that on an Identical Pictures Test, where the correct choice appeared in the sequence of possible answers was important. When the correct answer was later in the sequence, the error rate quadrupled (Nelson 1975, p. 7).

The research on reflectivity-impulsivity has important implications for improving college teaching. By relying so heavily on multiple-choice examinations we may not be getting an accurate picture of how much a student actually knows, since the time pressure may have a detrimental effect on the student. This may be particularly true for students who feel under great pressure to achieve a certain grade, since intense pressure serves to intensify a person's tendency to be impulsive or reflective. Under these circumstances, it is very difficult for the impulsive person to take a more deliberate approach, and the reflective person can often become nearly immobilized and unable to move ahead to finish a task.

The finding that a person's standing on this dimension can be changed somewhat is promising. Teachers could sensitize students to the fact that they can move too quickly (or too slowly) in answering questions on a test and urge them to be aware of that possibility.

Reliance on multiple-choice examinations occurs outside the classroom, of course. Standardized examinations used in admitting students to undergraduate, graduate, and professional schools usually consist primarily of multiple-choice questions. They are also widely used in selecting candidates for jobs. Teachers, test developers, and employers should give serious thought to developing evaluative tools that can gauge more accurately the level of knowledge people in fact possess.

(3) *Preceptive/Receptive–Systematic/Intuitive*—In a simulated problem used in a graduate school, a group of 20 people are held captive in a room by a crazed gunman who says he will kill anybody who

tries to get away. In this simulation, one member of the group suggests a clear, systematic way to escape. He first decides on a plan and then develops in his mind the steps necessary to carry out the plan. He felt the group should try to get the gunman to talk about himself, his hopes, and his dreams. Then the group would subtly begin to negotiate with him and gradually the pressure of 20 people working together would wear him down.

A second member of the group would approach the problem in an intuitive, unsystematic way. He first suggested the group should rush the gunman but decided that was too risky. He next thought one of them should sneak around behind the gunman and jump him. Then he suggested someone quickly switch off the light and then have everyone attack the gunman. He quickly flitted from one plan to the next, easily discarding it when it was deemed impractical.

These two people approached the problem, described by Ewing in *Psychology Today* (1977), in completely different ways, and, in this instance, the first student's approach was no doubt preferable. But in most situations there is much value in both approaches.

These approaches represent another view of cognitive style being studied by McKenney and Keen at the Harvard Business School (1974). Their research on corporate managers suggests that there are two modes of thought that people develop through training and differentiation: (1) information gathering, the perceptual processes people use in organizing stimuli; and (2) information evaluation, the sequence people use in analyzing the data and solving problems.

As they gather information, people may be *preceptive*, which is to say they filter the incoming data and watch for relationships among the findings. Their precepts serve as cues to help them receive the information in ways consistent with the system or concepts they bring to the task. Or they may be *receptive*, that is, they focus on the details as they are, not according to their relationships to other data or to preconceived ideas. Ewing (1977) has suggested that Sherlock Holmes was receptive, as he took in new information and refused to arrange it quickly to fit the "obvious" explanation for the murder advanced by the preceptive Dr. Watson and Inspector Lestrade.

There are advantages and disadvantages to each of these two modes of thinking. Receptive people, by focusing on details rather than patterns, may gather a lot of information but be unable to shape it into a meaningful whole; preceptive people, by their inclination to filter data, may ignore details that are relevant to solving the problem.

People also differ in how they approach information evaluation. Some tend to operate in a *systematic* way; they structure the prob-

lem in a particular manner that enables them to work their way through the data to arrive at a solution. On the other hand, people who are *intuitive* thinkers delay commiting themselves to a particular answer; they prefer the trial-and-error approach, as they jump quickly from one possible answer to another.

The advantage the systematic thinker has is that she can bring all her experience to bear on a problem. In contrast the intuitive thinker may not build on past knowledge and in effect continually start over. But she is better able to handle ill-defined or elusive problems that do not lend themselves to predetermined methods.

McKenney and Keen (1974) have summarized the characteristics of these two sets of information processing skills as follows. Preceptive thinkers watch for cues in the data, focus on relationships, and jump from one part of the data to another as they build a set of explanatory relationships. Receptive thinkers pay attention to details as they are, avoid preconceived ideas, and insist on seeing all the data before they reach their conclusions.

Systematic thinkers look first for a method, define the solution in terms of the methods they have used, discard alternatives quickly, carry out an orderly search for more data, and complete each step before going to the next one. Intuitive thinkers keep the overall problem in mind as they study it, rely on hunches, jump around in their search, redefine the problem frequently, and defend their solution not in terms of the methods used to achieve it but in terms of how well it fits.

As with other models we have examined, this one interacts with career selection. McKenney and Keen (1974) find that people with particular styles select careers that call for skills implicit in those styles, as shown in Table 1.

Table 1. Career Selection and Cognitive Style

	Preceptive	
Production and logistics Manager		Marketing manager
Statistician		Psychologist
Financial analyst		Historian
Systematic		**Intuitive**
Auditor		Architect
Clinical diagnostician		Bond salesman
	Receptive	

McKenney and Keen have also found there is a correlation between cognitive styles as they have studied them and the Myers-Briggs Type Indicator (discussed later). The persons who tended to be systematic were likely to have a thinking-cognitive orientation, while persons who tended to be intuitive were likely to have an intuitive-feeling orientation. There was another, although more modest relationship between two other dimensions: systematic people were more introverted, while intuitive people were more extroverted.

The findings of McKenney and Keen suggest several implications for educators. In evaluating student test responses on an essay examination, for example, the teacher who is a highly systematic thinker may unconsciously watch for the same kind of thinking in student essays and grade more favorably those that reflect this highly sequential way of thinking. In evaluating field work or independent study projects, the students may display one orientation or the other in problemsolving. Teachers need to be aware that both modes of thinking have their value and that the quality of the final outcome is more important than the means used to arrive at that outcome.

In career guidance, counselors can suggest that certain jobs seem to call for one orientation more than another. It may be more important, for example, for a clinical psychologist to be intuitive and feeling oriented than for a statistician, whose work may call for a more systematic approach to problems.

At the same time, teachers and counselors should certainly avoid freely categorizing people into one of these groups. Various professions can no doubt profit from people whose modes of thought vary substantially, and we should avoid channeling people in or out of certain career tracks without adequate sensitivity to what the student really wants to do.

Models of Student Response Styles

A distinct characteristic of the research we have reviewed in the previous section is that the conceptual base grows out of observing how people perceive and respond to stimuli in their environment. We turn now to research on student response styles, which grows out of psychological tests and on observations of how students behave and interact in the classroom. These models have been developed by Mann and others (1970), Riechmann and Grasha (1974) and Stern (1966).

The Mann Model—A model of student styles developed by Mann and others (1970) was done through a case study method at the University of Michigan. Their purpose was to try to understand what goes on in the classroom other than "covering content," that is, the effec-

tive elements that often seem to perplex teachers but that have such great impact on the success or failure of a class. The method employed was to study four undergraduate classes in psychology. The classes, made up of 47 women and 49 men, were all lecture-discussion sections of an introductory psychology class, taught by four instructors who each had had just one semester of prior university teaching experience. The data were gathered through extensive student and teacher interviews and ratings and use of the 16-category, member-leader scoring system (Mann et al. 1967). This system includes impulse areas (hostility and affection), authority relations areas (dominance and dependence), and ego state areas (anxiety, self-esteem, and depression). Trained observers scored each session of the classes, using the member-leader scoring system.

Through a factor analysis, the researchers identified eight clusters of students based on their behavior in the classroom. These were: compliant students; anxious-dependent students; discouraged workers; independent students; heroes; snipers; attention seekers; and silent students. The researchers stressed that classes vary and students change, and certainly no person fits perfectly into one typology. Nevertheless, these clusters can help teachers see their students as fully complex individuals rather than as an undifferentiated group.

Cluster one, the compliant students, comprised seven women and five men, who were mostly freshmen. These are the typical "good students" who adapt themselves to the will of authorities and conform to standards. They see the teacher as the dispenser of extrinsic rewards, and their main concern is understanding the material. They are very task oriented, nonrebellious, and accepting of what the teacher says. They are not particularly innovative or creative and, although they perform reasonably well in class, they are not particularly intellectual.

Cluster two, the anxious-dependent students, is a large group, composed of 16 women and 12 men. These students are angry on the inside and frightened on the outside. They depend on the teacher for knowledge and support; they are anxious about being evaluated. Their past lives have not been particularly happy and as children they experience a mix of parental affection and high standards. They are easily hurt and try to win love through accepting and following the standards set by persons in authority. They have a low regard for their intellectual competence, which may be based in reality, since their scores on standardized tests of verbal ability were lower than the other clusters. They are easily silenced by punitiveness on the

part of the teacher and unable to become involved in the material or to look at it from an independent point of view.

Cluster three, the discouraged workers, is a small cluster, made up of only four people (three men and one woman). These students have a mix of self-esteem and strength as well as guilt and depression. They are dissatisfied with themselves and have a pervasive feeling of guilt. They are generally depressed about human nature and the future in general. They are preoccupied with their inner selves, lack sensitivity to others, and have fantasies that they may hurt others.

Cluster four, the independent students, is made up of older students who are mostly sophomores and juniors. Eight of them are men and one is a woman. They are very intelligent, secure, and comfortable, able to see the class actvities and material with a certain detachment. They are not interested in an intense personal relationship with the teacher. They are capable of thinking critically and have an individualistic perspective. In their relations with other class members they are rather aloof.

Cluster five, the heroes, is made up of ten males. Their work in the class is tied to rebellion. They feel superior and see themselves as exceptional persons whose lives are apart from and beyond the common people. They have the highest college board scores of all the eight groups, and yet they are underachievers with grade averages of just over a "C." They tend not to be anxious or dependent and have the ability and the willingness to help the teacher when he is uncomfortable. The other side of the group members' personality and attitude, however, is that they are very rebellious and feel a need to be different from others. They see the university as an oppressive system and are distrustful of authorities. They have the ability to defeat the teacher in an argument and at times will insist on doing so. At the same time, they refuse to be defeated themselves. They desire closeness with others and yet are threatened by it at the same time.

Cluster six, the snipers, are much like the heroes, but their rebelliousness is more expressive and defensive. Six are men and three are women. They are underachievers and likely to address hostile comments to the teacher. They have a low level of self-esteem and general pessimism about relations with authority figures. They have a low investment in the class and this, combined with the need to rebel, leads to a kind of sniping at the teacher. They are pessimistic about the future, and have a need to remain uninvolved with the class and with major substantive issues. They were unhappy as children and their fathers were authoritarian yet weak.

Cluster seven, the attention seekers, consists of five men and six

women. The members of this group have a predominantly social orientation and are frequently involved in joking, talking, showing-off, and bragging. They tend to enjoy and need to be with other people. Their interest in social interaction rather than in work inhibits their intellectual development. They are very concerned about how others perceive them and about the impression they make on the teacher. They have a preoccupation with the appearance of things and rely heavily on others' standards in forming their own judgments.

Cluster eight, the silent students, is a very large group, made up of 21 people (eight men and thirteen women,) and they are characterized not so much by what they do but what they do not do. They have a tremendous sense of helplessness and vulnerability. They feel very suspicious, almost paranoid, and can be very disconcerting to others. The males are angry and defensive and feel the teacher is a threat to their identity, yet at the same time they yearn for the affection and attention of the teacher. The females seem to be acting out the stereotypical feminine sex role that says "good little girls are seen but not heard." The parents of the people in this cluster were emotionally distant or physically absent and seldom expressed anger at them. Thus they received so little feedback they could not get an accurate evaluation of their behavior. Their self-worth is deeply tied up with the work they do in the class. They are extremely sensitive to what they think the teacher wants and they spend an inordinate amount of time trying to figure out what that is. These students want attention and to be center-stage very badly, but their fear of failure is so great that they prefer to remain silent.

The Grasha-Riechmann Model—A model of student response styles has been developed by Grasha (1972) and by Riechmann and Grasha (1974). Over a period of two years, Grasha interviewed students in his classes at the University of Cincinnati with a view to ascertaining student response styles. As he did so, three styles emerged: avoidant-participant, competitive-collaborative, and dependent-independent. The response styles were defined around three classroom dimensions: student attitudes toward learning, their views of the teacher and/or peers, and reaction to classroom procedures.

Subsequently, Grasha and Riechmann developed an instrument (the Grasha-Riechmann Student Learning Style Scales) by using a "rational" approach to scale construction.* The instrument was developed with the assistance of undergraduate students who were asked

* For a discussion of the "rational" approach to scale construction, see O. N. Jackson, "The dynamics of structured personality tests: 1971." *Psychological Review* 78 (1971): 229-243.

to sort student behaviors in a typical classroom into the six student response styles mentioned earlier. The learning styles developed through this process are as follows:

(1) The *independent* student likes to think for herself. She prefers working on her own but will listen to others. She is confident of her ability to learn and will learn what she feels is needed.

(2) The *dependent* student has little intellectual curiosity and learns only what is required. She sees the teacher as a source of structure and support, and she looks to authorities to be told what to do.

(3) The *collaborative* student likes learning through sharing with others. She is cooperative and enjoys working with others, and she sees the classroom as a place for learning and for interaction with others.

(4) The *competitive* student feels she must compete with others for reward, and her motivation to learn is to do better than others. She regards the classroom as strictly a win-lose situation in which she must win.

(5) The *participant* student desires to learn course content and enjoys attending class. She assumes responsibility for getting a lot out of class and participates with others when told to do so. However, she does little that is not required.

(6) The *avoidant* student does not participate in the class actively and is not interested in learning course content.

Authoritarians, Antiauthoritarians, and Rationals—Stern studied students at the University of Chicago during the 1950s and categorized the subjects as authoritarians, antiauthoritarians, and rationals. The authoritarians tended to be Roman Catholic or members of evangelical Protestant religions. They did poorly in the humanities and social sciences and preferred law, business, medicine or engineering, saw the purpose of higher education strictly as vocational preparation, were submissive to authority figures, has rigid personal relationships with others, were inhibited, and disliked permissive rules at the university.

The antiauthoritarians had no religious affiliations, and their parents were well educated. They did well in humanities and the social sciences, planned to have careers in these areas, and were excellent students with wide intellectual and cultural interests. They were viewed with some reservations by their teachers, who were wary of the students' independence and challenging manner.

The rationals were much more of a mixed group. They had a variety of religious backgrounds and fell into no particular career categories, were not as bright as the antiauthoritarians (but brighter

than the authoritarians), and were characterized by an impersonal detachment and an emphasis on abstraction and intellectualization.

In a subsequent study of 104 students at the University of Chicago and Syracuse University, the following characteristics were associated with each type. The authoritarians preferred studying alone in the same place, which was free of distractions, maintained rigid time schedules, did not like theoretical discussion, and wanted the teacher to give a clear explanation of the material. They regarded getting good grades as the payoff that led to good jobs, and they prepared for tests by reviewing notes and outlines and memorizing key facts.

The antiauthoritarians varied their place and mode of study, sometimes wanting to study alone and sometimes with others. They enjoyed discussion of side issues and enjoyed readings that challenged them. They prepared for exams by trying to get a sense of the totality of the course and felt the tests were helpful to them in evaluating their own work.

The rationals usually studied alone and in the same place but they enjoyed studying with others at times for the exchange of ideas that it provided. They found difficult readings frustrating but liked discussion of side issues in class, always wanted to be prepared for class, prepared for examinations by reviewing and memorizing the main points made by the instructor, and felt success on examinations depended on good preparation as well as approaching each question in a systematic and careful way.

In 1955, three classes at Syracuse University were studied, one made up of authoritarians, one of antiauthoritarians, and one of rationals. All three were taught by the same teacher who did not know the characteristics of the groups and who agreed to maintain a diary of his reactions to the classes. Overall he saw the first group, the authoritarians, as generally lacking in curiosity and initiative. There was little interplay among the students; and the teacher, finding it difficult to stimulate good discussion, was tempted to give lectures to them, although he strived for discussion in each of the groups.

The teacher saw the second group, the antiauthoritarians, as delightful. They had a critical, yet friendly attitude, questioned the statements he made, and enjoyed critical debate.

The third group, the rationals, at first impressed the teacher as "all future campus leaders." They were a friendly, intelligent, polite group. But later in the semester he felt they had become bland and self-assured and demonstrated little creativity or critical thinking.

Stern suggests the first group gained significantly from the firm use of the discussion method used by the teacher. The other two groups probably did not profit from that approach.

He states that the instructor's persistent use of the discussion method helped the authoritarians learn in general education, an area of study they are usually resistant to. The other two groups had apparently already developed the competencies the course was geared to help them develop; hence, they experienced very little gain.

The antiauthoritarians may have gained little from the course but simply enjoyed the opportunity provided by the class discussions to explore ideas. The rationals may have become bland about the whole matter because, since they saw little to gain from the class, they saw little direct benefit to be gained from serious participation.

The finding that the discussion method had far more impact on the authoritarians than on the others is a significant one. It reminds us that our concern in examining learning styles is to find which students learn best under which conditions, and Stern's work indicates that there is a very important interaction between student style and instructional approach.

As we look back now at these three models of student response styles provided by Mann, Grasha and Riechmann, and Stern, we can see there are a number of similarities to the cognitive-style models described earlier. Several of the students in the clusters described by Mann and by Grasha and Riechmann have characteristics similar to persons Witkin has described as field dependent. Mann's *compliant* and *anxious* students and Grasha and Riechmann's *dependent* students are greatly influenced by authority figures. Mann's *attention seekers* and Grasha and Riechmann's *collaborative* students all have a strong social orientation. Mann's *silent* students are greatly influenced by criticism.

Other students in the Mann clusters sound like field independents. This is true for the *independent* students (and for Grasha and Riechmann's *independent* students) as well as for the *heroes,* none of whom are particularly influenced by authority figures. The gender of the people in these groups may be significant, too. Practically all of Mann's *independents* are men, and the *heroes* cluster has no women in it. This is consistent with the finding that women tend to be more field dependent and conditioned by societal norms to be less rebellious and aggressive than men. Conversely, the clusters that Mann has called *attention seekers* and *silent* students, whom we have suggested may be field dependents, are made up primarily of women.

These comments are only speculation on our part, but the simi-

larities across the models do make sense, at least on the surface, and could prove to be fertile areas for empirical study.

Integrated Models of Learning Styles

We turn now to an area of research that takes as a point of departure not cognitive style or student response style as such, but rather the more global perspectives provided by learning theory, individual development, and personality types.

The Myers-Briggs Type Indicator—The Myers-Briggs Type Indicator (MBTI) (Myers and Briggs 1967) is an instrument published by the Educational Testing Service in 1962 and is based on research growing out of Jung's ideas that behavior is due not to chance but results from observable and measurable differences in mental functioning. Roberts (1977) noted that "Jung's theory states . . . that there are two ways of perceiving—by sensing or by intuition—and two ways of judging—by thinking or by feeling. In addition to whichever of these processes an individual prefers, there will be accompanying preference for introversion or extroversion" (p. 141).

The MBTI consists of four scales: Extroversion-Introversion, Sensation-Intuition, Thinking-Feeling, and Judging-Perceiving. On the Extroversion-Introversion (E-I) scale, the direction of a person's interest is toward the outer world of persons, actions, and objects (E), or to the inner world of ideas and concepts (I). On the Sensing-Intuition (S-N) scale, it is determined whether the person attaches greater significance to the realities of experience (S), or to the inferred meanings, possibilities, and relationships of experience (N). On the Thinking-Feeling (T-F) scale, it is determined whether the person relies more on logical order in making judgments (T) or on personal values and importance (F). On the Judging-Perception (J-P) scale, it is determined whether the person uses a judgmental attitude and an approach characterized by planning and controlling events (J) or whether she has the perceptive attitude of waiting to see what happens and reacting to events with spontaneity (P).

The MBTI has been used extensively to check personality types of community college teachers and community college students (Roberts 1977). The typologies of 354 community college teachers and 335 community college freshmen were collected and compared. It was found that 63 percent of the teachers were intuitive (N) while only 26.5 percent of the students were intuitive (N). Seventy-three percent of the students were sensing (S) types.

Similar results were found in a study of 77 upper-division students majoring in agricultural economics and 11 agricultural economics

faculty members at Texas Tech University (Roberts and Lee 1977). The MBTI revealed the following:

(1) Seventy-eight percent of the students were sensing (S) versus intuitive (N), compared with only 55 percent of the teachers;

(2) Eighty-two percent of the teachers were judging (J) versus perceptive (P), compared with 42 percent of the students;

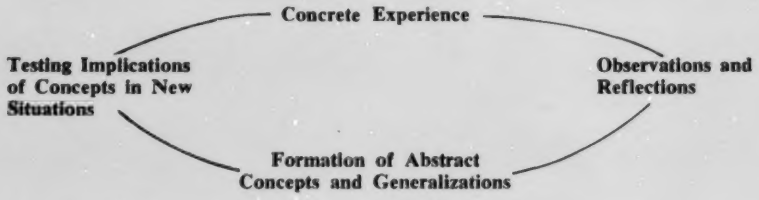
(3) Eighty-two percent of the teachers were thinking (T) versus feeling (F), compared with 64 percent of the students.

Hence, there is a remarkable mismatch between the teachers and the students.

The findings that come from use of the Myers-Briggs Type Indicator have several implications for improving college teaching. Roberts reports that additional studies indicate that sensing (S) and judging (J) types prefer to learn in a systematic, orderly way and to use their five senses (they would learn well when taught by a variety of instructional approaches). In contrast, intuitive (N) and perceptive (P) types would prefer to learn in more unstructured ways, with emphasis on writing and speaking. It seems, then, that teachers can profit from assessing their students' personality orientations as well as their own and being sensitive to the extent of the match or mismatch between them. Assignments to students and instructional modes could then be geared to be congruent (or incongruent, depending on the purpose of the learning activity) with the students' learning styles.

MBTI findings can also be helpful in career guidance. Myers (1976) has suggested that sensing-thinking types are more practical and tend to look at facts in an impersonal way. They would enjoy careers such as accounting, construction, economics, and law. Sensing-feeling types are more sociable and friendly and tend to enter fields such as sales, social service, and customer relations. Intuitive-feeling types enjoy psychology, writing, teaching, and counseling, while intuitive-thinking types tend to enter science, research, and management.

Figure 1. The Experiential Learning Model.


Concrete Experience
Observations and Reflections
Formation of Abstract Concepts and Generalizations
Testing Implications of Concepts in New Situations

The Kolb Model—Kolb (forthcoming) has described a model of experimential learning that provides a theoretical framework for thinking about learning styles. The model grows out of Jungian concepts of types, which states that "fulfillment in adult development is accomplished by higher level integration and expression of nondominant modes of dealing with the world" (p. 8). In this model, learning is seen as a four-stage cycle (see Figure 1). A person has immediate, concrete experience and then develops observations and reflections on this experience. From these, she forms generalizations or abstract concepts. The implications she deduces from these concepts serve as guides as she involves herself in new experiences.

To be effective, the learner needs four kinds of abilities, each with a particular emphasis:

Ability	Description	Emphasis
(1) Concrete Experience (CE)	The learner involves herself fully in the new experience.	Feeling
(2) Reflection Observation (RO)	The learner observes and reflects on the experiences from different perspectives.	Watching
(3) Abstract Conceptualization (AC)	The learner creates concepts that integrate her observations into sound theories.	Thinking
(4) Active Experimentation (AE)	The learner uses the theories to solve problems and make decisions.	Doing

There are two dimensions of the learning process: concrete experiencing at one extreme and abstract conceptualization at the other; and active experimentation at one end and reflective observation at the other. People are always choosing which set of learning abilities they will use in a particular situation. "Thus, in the process of learning, one moves in varying degrees from actor to observer, from specific involvement to general analytic detachment" (Kolb [1978], p. 10).

Theorists state that as children mature, they move from concreteness to abstraction, and this is positive. Yet neither of these is exclusively good; rather, each has its advantages. As people go through life they come to deal with situations in characteristic ways, and most of us develop certain learning styles that emphasize particular learning abilities over others.

To determine people's learning styles, Kolb has developed a Learning Style Inventory and has identified four types of styles. The first is "converger," the learners who work best when there is a simple,

correct answer to a problem. They are called convergers because, when presented with a question or a task, they move quickly to find the one correct answer. Their dominant learning abilities are Abstract Conceptualization and Active Experimentation. These people are relatively unemotional and prefer dealing with things rather than people. They usually have rather narrow interests and tend to specialize in the physical sciences or engineering.

The second is "diverger." Their major learning orientations are Concrete Experience and Reflective Observation, the opposite of the convergers. Their strength is in their imaginative ability. They like to view situations from different perspectives and then weave many relationships into a meaningful whole. They are called divergers because they are good at generating ideas and brainstorming. They tend to be people-oriented and emotional and they often specialize in the humanities and the liberal arts. They enter fields such as counseling, personnel management, and organizational development.

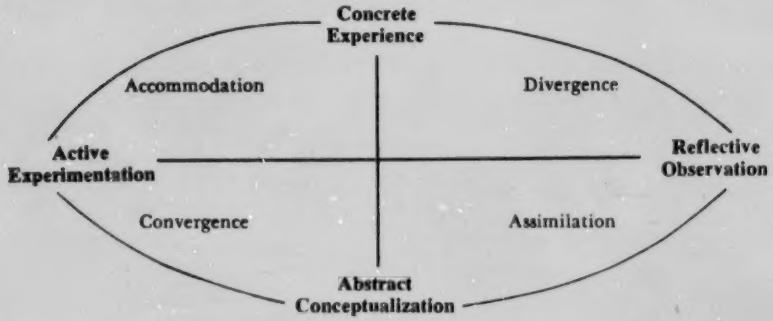
Next is "assimilator," whose dominant learning orientations are Abstract Conceptualization and Reflective Observation. Their strength is in creating theoretical models. They are called assimilators because they like to assimilate diverse items into an integrated whole. They are less interested in people and are concerned about abstract concepts. They have little concern about the practical application of ideas. They tend to specialize in science and math and often work in research and planning.

Fourth is "accommodator." Their strengths are the opposite of the assimilators. They are best at Concrete Experiences and Active Experimentation, and they like to focus on doing things and having new experiences. They are risk-takers and are called accommodators because they do well in situations where they must adapt to meet new circumstances. They are intuitive and often use a trial-and-error strategy in solving problems. They are often impatient, even "pushy," and when confronted with a theory that does not match the facts as they see them, they will discard the theory. They enter technical or business fields and like action-oriented jobs such as sales and marketing.

A synthesis of (1) the experiential learning model, (2) the two dimensions of the learning process (concrete experiencing-abstraction conceptualization and active experimentation-reflective observation), and (3) the four learning styles are shown in Figure 2 (Adapted from Kolb 1976).

Kolb notes that it is important not to stereotype people with these or other catgeories. One of the fruits of the growing body of research

Figure 2. Experiential Learning and Learning Styles.



on learning styles is to highlight the complexity of the learning process.

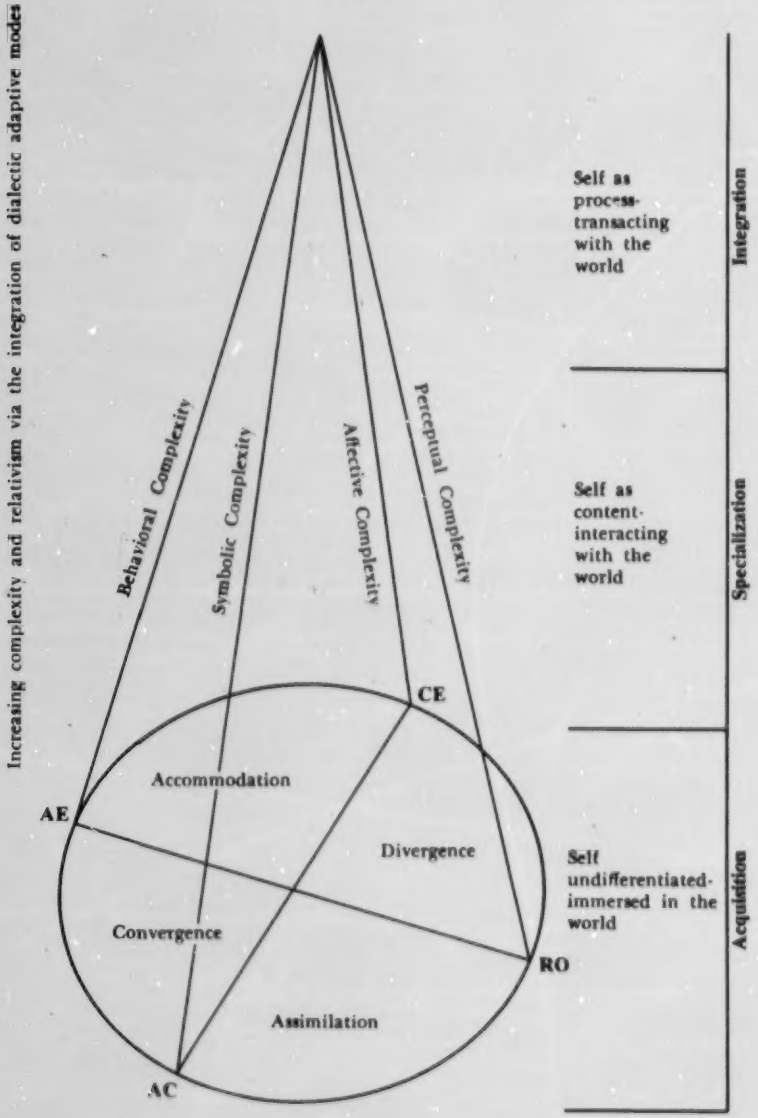
One of the values of the experiential learning model is that it takes into account the fact that learning is a continuing process of interacting with the experiences in one's life as well as the tensions caused by such experiences. The ways in which a person learns is a major force in one's personal development and growth. Kolb suggests that people go through three growth processes: acquisition, specialization, and integration. First, a person acquires basic learning abilities. As she increases her fund of knowledge and experience, a certain learning style is emphasized. This process of specialization leads to increased competence in particular vocational and personal spheres of life. This stops at mid-career. Finally, the person enters the integrative stage, when there is a reassertion of learning styles that have lain fallow for many years. These are expressed anew as the person takes up new interests and life goals.*

This process of development is marked by increasing complexity and by higher levels of integration of the conflicts between the four modes of learning (Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation).

A major dimension of personal growth is associated with each of the four modes: with concrete experience there is an increase in affective complexity; with reflective observation, there is an increase in perceptual complexity; with abstract conceptualization there is an increase in symbolic complexity; and with active experimenta-

* For a detailed discussion of adult development see Chickering (1977), Levinson et al. (1978), and Sheehy (1976).

Figure 3. Experiential Learning, Learning Styles, and Adult Development.



tion there is an increase in behavioral complexity. In a person's early development, progress on any dimension operates somewhat independently of growth on the others. In later years there is a need for a greater integration of the four adaptive modes.

Kolb has summarized his conception of the experiential learning model, the four modes of learning, and adult development in the cone presented in Figure 3. The base of the cone represents the lower stages of development, while the apex reflects the peak of development. The four dimensions of growth become more highly integrated at the higher stages of development.

The highlights of a study of 800 managers and graduate students in management carried out at the Massachusetts Institute of Technology serve as an example of the kinds of information to be derived from the Learning Styles Inventory. Kolb (forthcoming) found that the learning styles of the persons studied varied with their undergraduate major. Those who had business as an undergraduate major tended to be accommodators, engineers tended to be convergers, persons who majored in history, English, psychology and political science tended to be divergers, and those who were in mathematics, chemistry, economics, and sociology tended to be assimilators. People who majored in physics fell between the convergent and assimilative quadrants. Kolb concluded, "These data suggest that undergraduate education was a major factor in shaping individual learning style either by the process of selection into a discipline or socialization while learning in that discipline or, as is mostly likely, both" (Kolb forthcoming (1966), pp. 23-25).

A second study, done by Altmeyer (1966), suggests that accentuating one kind of cognitive ability can decrease one's skills in another. He administered two batteries of tests to students in engineering/science and fine arts and measured their skills in analytic reasoning and in creative thinking. The engineering/science students, as expected, performed better on the analytic reasoning test, while the fine arts students did better on the creative thinking part. Over the college years, the gaps between the two groups widened: the engineering/science students became more analytical and the fine arts students became more creative. But the surprising thing was that the fine arts students became less analytical over the college years, and the engineering/science students became less creative.

This finding again raises the question of the wisdom of matching students learning style with instructional mode. We stated earlier that the answer to this question depends on the purpose of the learning, whether it was instrumental or developmental. The Altmeyer

finding can help sensitize us to the seriousness of the issue and suggests we should be keenly aware of the pay-offs and the limitations of such matching.

The Kolb model, as are others we have examined, can be useful in career guidance in the design of instruction. It also helps us see learning styles in the more global perspective of how people learn and develop as they mature, a particularly helpful characteristic as colleges and universities move more to an emphasis on lifelong learning of adults. And it provides at least the beginnings of a theoretical framework for viewing learning styles as they relate to other aspects of learning and individual development.

Cognitive Style Mapping

We come now to the last of the models we shall examine. This is "Cognitive Style Mapping" as developed by the late Joseph E. Hill and his associates at Oakland Community College in Bloomfield Hills, Michigan. Hill felt it was possible to develop an underlying structure and scientific language for education, and this he called the Educational Sciences. Four assumptions were made in developing the educational sciences (Hill and Nunnery 1973):

(1) Education is the process of searching for meaning.

(2) Thought is different from language.

(3) Man is a social creature with a unique capacity for deriving meaning from his environment and personal experiences through the creation and use of symbols.

(4) Not content with biological satisfaction alone, man continually seeks meaning.

The first educational science is concerned with *symbols and their meanings*. It is based on the belief that people use two kinds of symbols, theoretical and qualitative, and these are basic to the acquisition of knowledge and meaning. The theoretical symbols include the same areas that are usually measured on academic ability tests and include:

Element	Description*
(1) Theoretical Auditory Linguistics	Finding meaning through words; a preference for hearing words.
(2) Theoretical Auditory Quantitative	Finding meaning through spoken numbers; a preference for hearing non-word symbols.
(3) Theoretical Visual Linguistics	Finding meaning through seeing words; a preference for reading.
(4) Theoretical Visual Quantitative	Finding meaning through numerical symbols; a preference for seeing non-word symbols.

* The elements and descriptions presented here are adapted from Sims and Ehrhardt (1978).

The first five *Qualitative Symbols* are associated with sensing stimuli:

(5) Qualitative Auditory	Perceiving meaning through hearing.
(6) Qualitative Olfactory	Perceiving meaning through smell.
(7) Qualitative Savory	Perceiving meaning through taste.
(8) Qualitative Tactile	Perceiving meaning through touch, temperature, and pain.
(9) Qualitative Visual	Perceiving meaning through sight.

The other eleven *Qualitative Symbols* are as follows:

(10) Qualitative Code Proprioceptive	Synthesizing parts of a task, e.g., playing a musical instrument.
(11) Qualitative Code Empathetic	Sensitivity to others' feelings.
(12) Qualitative Code Esthetic	Enjoying the beauty of something.
(13) Qualitative Code Ethical	Commitment to a set of values.
(14) Qualitative Code Histrionic	Exhibiting a deliberate behavior.
(15) Qualitative Code Kinesics	Understanding and communicating through non verbal means, e.g., a smile.
(16) Qualitative Code Kinesthetic	Performing motor skills in an acceptable form, such as in bowling.
(17) Qualitative Code Proxemics	Ability to judge the physical as well as social distance that another person would allow.
(18) Qualitative Code Synnoetics	Knowledge of self.
(19) Qualitative Code Transactional	Ability to communicate with others in order to sell a product or influence behavior.
(20) Qualitative Code Temporal	Awareness of time and time expectations.

The second educational science is *Cultural Determinants* of the meanings of symbols and is concerned with the cultural influences that affect what the symbols mean to particular individuals. The cultural determinants are:

(21) Associates	The extent to which people are influenced by friends and other persons outside the family.
(22) Family	The influence derived from family and authority figures.
(23) Individual	Significant independence in making decisions.

Modalities of Influence, the third educational science, are the elements that show how a person makes inferences.

(24) Magnitude	A type of categorical reasoning in which the person uses classification or rules in deciding whether to accept or reject an idea.
(25) Difference	A kind of reasoning in which the person looks for differences between and among concepts.
(26) Relationship	A kind of reasoning in which the person notes how things are alike.
(27) Appraisal	A type of reasoning in which the person draws on all three of the above modalities.
(28) Deductive	Deductive reasoning as is used in geometry or syllogisms.

The fourth science is biochemical and electro-physiological aspects of *memory-concern*. The fifth is *cognitive style*, which is the product of the first four sciences. The other two are *teaching, counseling, and administrative style* and *systematic analysis decision making*.

The Hill model, or varied forms of it, is being used with students from elementary school through graduate school in institutions throughout the country. Using instruments that include the 28 elements listed above, students' learning styles are "mapped" and educational experiences consistent with those styles are provided.

A number of community colleges have initiated such programs, including Mountain View Community College and North Lake College in the Dallas Community College District, Texas; Oakland Community College, Michigan; Hillsborough Community College and Polk Community College in Florida; Fox Valley Technical Institute, Wisconsin; and Central Piedmont Community College in North Carolina. There is also some movement toward forming a national association of persons in postsecondary institutions interested in cognitive-style mapping.*

There are numerous articles in the literature that describe the Hill model of cognitive-style mapping (see, for example, Griffin (1974), Harper (n.d), Hilgendorf (n.d.), Heun (1975), McAdam (1971), Neil (1975). But there are only a few studies that address the key question of whether matching cognitive style with institutional mode brings about increased learning. One is by Terrell (1976), conducted in a community college, in which 51 students enrolled in an audiotutorial course were given pre- and post-tests to determine their level of anxiety. Their cognitive style of learning was also determined. It was found that students whose cognitive styles matched the instructional mode tended to achieve higher grades and experienced greater reduction in anxiety than the nonmatched students.

While there is a paucity of material in this area of the literature, there are indications that a great deal of "in-house" research has been done at institutions that are using cognitive-style mapping. Much activity is going on in community colleges, where the emphasis is on teaching rather than publishing.

Mountain View Community College, which has been working with cognitive-style mapping since 1973, and which has mapped some 8,000 students, carried out an evaluative study of its program in 1976 and 1977 (Sims and Ehrhardt, 1978). Participating students and faculty members completed questionnaires concerning their experiences. The

* Personal correspondence, Dr. Harryette Ehrhardt, Mountain View Community College, Dallas, Texas.

students felt their maps had given them helpful information on how they learned, many had actually changed the way they studied, and they expected to select course sections on the basis of the mapping experience. Faculty members said mapping was worth the time involved, assisted them in understanding student learning styles, and helped them see how to make needed changes in their instruction.

The cognitive-style mapping model is so comprehensive that it seems to connect with numerous dimensions we have encountered before. The elements in the *symbols-and-their-meanings* sphere remind us of the type of findings that come from the Myers-Briggs Type Indicator. The *cultural determinants* sphere is similar to the aspects of the influence of authority found in field dependent-independent tests. The elements in the *modalities of influence* are very much like the preceptive-receptive orientations of people.

Summary

We have examined three dimensions of cognitive styles (field dependence-independence, reflection-impulsivity, and preceptive-receptive/intuitive), three models of student response styles (described by Mann and others, Grasha and Riechmann, and Stern), and three integrated models (use of the Myers-Briggs Type Indicator, the Kolb model, and cognitive style mapping). We have found that learning styles have been the focus of extensive research, particularly in the field of psychological perception, and there is substantial similarity and overlap in the models, even though they were developed by different researchers and come out of different academic disciplines.

Philosophical and pragmatic questions have been raised as to the wisdom of matching students with particular learning styles to teaching approaches that are congruent with those styles. The goals of the learning endeavor and the relative payoff for matching and mismatching must be seriously considered.

The research findings on learning styles offer substantial promise to teachers, counselors, and the students themselves in terms of finding better ways for students to learn. But while matching learning style with instructional mode apparently facilitates positive interpersonal relations, and while it would seem to point the way for increased learning, the empirical data that support this idea are rather scarce. Such a significant gap in the research must be filled if knowledge about learning styles is to become a significant force in improving college and university teaching.

While learning styles and student gain should be a high priority for future research, the findings that are available already are cer-

tainly promising for more effective student learning. But one of the most significant implications of the present research is that important changes in the administration of instructional programs need to take place if teachers are to act on what they know about the learning styles students bring to the classroom. It is to this topic—changes in program administration—that we now turn.

Part II: Perspectives, Obstacles, and Assumptions About Implementation

Introduction

The use of knowledge about the learning styles of college students can be examined from several perspectives. Learning styles can imply instructional alternatives. Each perspective on possible ways to use knowledge about students' individual learning styles and subsequent appropriate instructional modes can also suggest obstacles to the choice of the use of this knowledge base.

For example, one possible format for using the knowledge about one student's way of learning best is to share it with him. However, sharing the information from a score of learning styles inventory, test, and/or assessment with a student, raises several questions, the subsequent answers to which reflect an individual institution's perspective that would color possible uses of the knowledge base. Also, the answers to these questions can take the form of the collection of data needed to construct institutional plans to enhance the academic success of students in college settings. Some questions to be studied are:

- What instruments will be used?
- What criteria will be used to select the instrument?
- What does the student need to know? How can the student use the knowledge about himself to increase his chances of success in the traditional instructional setting in which he finds himself?
- Who will score the instrument? How will the data be prepared for subsequent dialogue with the student? Should we add a new staff member? Or, use the computer?
- Who will be responsible for this process? A counselor? A faculty member? A staff member new to the institution?
- What kinds of experience or training does this person need to have to conduct a dialogue with students regarding this knowledge of particular learning styles and its implications for his particular educational setting?
- How can the student use the information?
- Where should this function be housed in the institution's hierarchy? Within the counseling center? Departmental advising? A separate unit in the Learning Resources Center? A new unit of the college such as an Open College, University College? A testing center?

- What are the costs of this process? (Such as purchase of tests, duplication of materials, scoring costs, staff time, clerical costs.)
- When will this dialogue take place? In the fall orientation? During the advising session? Scheduled by the student on demand? In the classroom by an instructor?

The answers to these questions concern time, resources, space, and personnel. These four categories sometimes represent the total administrative perspective when deciding about the implementation of the use of learning styles in the college setting regardless of the approach taken.

Even after considering answers to the questions posed here, there are other things for an institution to think about before it begins to use learning styles research. This is especially true if the answers to the listed questions above point to obstacles that might make such an institutional commitment less than desirable because of the institutional dissonance such changes would create.

Another perspective to consider is how to use the knowledge of learning styles as an educational tool in the classroom by making the knowledge available to faculty to enhance their skills in the instructional processes. This poses other questions:

- Should the scope of the endeavor be college-wide?
- Should it be incorporated in all instructional areas or should it be used as faculty request the instruments?
- Should it be used in the classroom as an integral part of the instructional process?
- Should a special project or unit of the college be established as an experimental design for refining the endeavor?
- Would the knowledge of how to determine students' learning styles be communicated to, and available to, all faculty to use with no organized effort?

When these questions are answered, still another set of questions emerge, which center around implementation of an institutional approach to offer alternative modes of instruction. Planning and implementation should be conducted in the light of institutional characteristics.

Factors Influencing the Use of Learning Styles—First and foremost, an evaluation of the most appropriate way to use knowledge of learning styles should be done based on institutional climate. The atmosphere of the institution toward educational change especially regarding the use of knowledge of learning styles as a way to change

instructional processes must be understood. A less than innovative organizational climate represents a significant obstacle to overcome.

One must also consider the factors that would influence the appropriate method of implementation. Identifying factors that are essential to implementing an institutional plan proved vexing to the authors, since a search of the literature regarding learning styles offered no guidance studies on how to implement and administer such endeavors within the educational setting; however, the literature on educational change does offer some ideas on implementation.

Lindquist (forthcoming) suggests that one way to look at a new proposal is to be aware of "existing structure [in an organization], vested interests, values, standards, and making the new alternative as compatible as possible without castrating it or violating its basic integrity." He goes on to say that the fundamental principle running through all of the suggestions for change is involvement. Lindquist summarizes some essential considerations:

> First, involve key leaders, faculty as well as administrators, supporters as well as detractors in diagnosing the need for new developments [in this case the use of the knowledge base of different styles of student learning and offering alternative modes of instruction]. Second, involve these leaders in considering various alternative solutions to the problems they have helped identify.

A diagnosis of the current organization can be done in a number of ways, such as interviews, questions, observations, sociograms, and standardized instruments for determining organizational climate.*

Analyzing the implementation of knowledge about learning styles necessitates a review of appropriate methods to use when beginning.

- Where should the coordination of the endeavor be placed? With counseling? With instruction? A new institutional unit?
- Should we begin the implementation with the teaching faculty by developing inservice training activities that enhance their capacity of preparing alternative teaching styles for the various learning styles of students? Or as Roberts (1977) suggests in the use of information from Myers-Briggs Type Indicator, match students of like personality styles with teachers of like personalities to enhance the educational successes of students.

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* This diagnosis opens another group of questions about the use of organizational assessment tools that the authors will not deal with here. The literature of the educational administration research indicated in the bibliography reflects instruments for possible use. Additional discussion of organizational climate will be presented in the perspective of an institutional approach to learning styles.

- Should the endeavor be an objective of each unit of the college and be coordinated through normal administrative lines, with each administrator planning the implementation?
- Should the planning be within one unit of the organization such as counseling, instructional or learning resources center and involve just that staff in the planning phase?
- Should a committee be established to plan the implementation, then present the plan to appropriate levels of the institution?

Each of the above starting points can be valid. But each alternative has a set of spatial and human relationships. Seeing all data about institutional relationships and potential impingments upon present settings is the task of the leaders of the endeavor.

The following sections explore possible implementation approaches. Whatever approach is chosen, it must have a substantial impact on the organization and its members. Regardless of the approach taken to the use of the knowledge of student learning styles, there will be barriers to the possible uses of information regarding how students learn, and these barriers must be ascertained at the beginning of the endeavor before appropriate implementation plans can be made.

The next section considers the sharing of knowledge about learning styles with students. It will not consider change in instructional techniques but rather how this knowledge can be used by a student in a traditional college setting. This discussion will be followed by consideration of the classroom approach and its impact on instruction and the institutional approach and its impact on the total systems within a college.

The Student's Use of Learning Style and Its Impact

If the obstacles within instructional divisions of the institution are too great to overcome, then consideration should be given to ways and means of sharing the information from a learning styles inventory, test, and/or assessment with the student, without incorporation into the teaching/learning setting.

Appropriate Instruments—Appropriate instruments might include the Cognitive Style Map (CSM), the Myers-Briggs Inventory (MBTI) or Kolb's Learning Styles Inventory (LSI) described in Part I. All of these are appropriate for college students, but each elicits different information for the student's consideration of himself and how he prefers to learn. Each of these test instruments is based on an individual's ability to respond to the written symbol, to read at a certain level, and to comprehend accordingly; consequently, reading ability

may need to be assessed before providing students with knowledge of their learning style.

The CSM points to specific characteristics of cognitive style and determines how that individual, in a college setting, uses symbols in problem-solving operations. From this perspective, the student is measured to determine the cultural forces contributing to individuality. Does he have a high associative need? Does he exhibit a strong family influence, or is he able to function independent of external forces? The student that exhibits a high degree of individuality may require little or no direction from his instructor. Armed with this knowledge about himself, the student can structure his own educational study. The student with a high associative need may be successful only when he functions as a member of a small group. This student may then actively seek to study and learn with others. The student who demonstrates a strong family influence may need the direction of a person acting as surrogate parent. He may schedule more of his time with the instructor—during office hours, for example.

The CSM is used to determine the student's inferential pattern. Does he tend to categorize facts and details, or to discern differences and relationships, or does he synthesize his experience to draw conclusions from this inferential pattern? These results indicate to the student his method of resolution in a problem-solving situation Finally, how much of what he learns does he remember? Does the student's memory function use the processes of recognition, retention, recall, or association? When these four areas have been thoroughly probed, they are combined to define the individual and to comprise the student's cognitive style or, more specifically with this instrument, his cognitive map. With this information, the student can select appropriate educational activities that fit his learning style.

Appropriate learning activities for the student with a high degree of ability in the Theoretical Visual Linguistic (TVL) area refers the student to working with textual materials. If that student has a strong degree of independence as a cultural determinant, then success in an independent mode of instruction becomes more of a certainty. These characteristics, associated with a high degree of adherence to rules (Qualitative Code Ethic—QCE), assure success with textual materials. On the other hand, the student who demonstrates a weakness in the linguistic area but a strength in the use of his hearing (Qualitative Auditory) should succeed with classroom lectures or audiotape material.

The MBTI has other indicators of appropriate learning activities for the various personality types it identifies. It can also provide the

student with knowledge of self that can be used by him to structure his own educational endeavors. It is particularly useful in choosing appropriate settings for an identified personality type as well acting as a guideline to appropriate career choices.

Kolb's LSI provides information to the student regarding his preferences toward methods of learning. Of the three instruments, it is easiest to score and to describe learning needs of four categories of learning characteristics.

Initial Steps for Implementation—The CSM and the MBTI are examples of the more difficult instruments to implement. The initial steps in providing this data based on CSM and MBTI to the student may indicate that an institution contemplating the use of these instruments or students will need to consider the impact on the institution. For example, the institution may have to establish a place on campus and hire a group of trained staff to administer and conduct dialogue with the student regarding his unique style of learning and its implications for his particular educational setting. The cost of providing a setting, purchase of instruments, duplication of materials, scoring, staff time, and clerical help should be calculated. Considerations of when to offer this assessment have ramifications for the institutional calendar. Appropriate times for this endeavor could be: during the fall orientation; during the academic advising session; or scheduled by the student, on demand, in the counseling unit of the institution.

Another way to provide this information is at the beginning of classroom activities for each course, with the instrument being administered by the instructor.

One Teacher's Use of Learning Styles

Another way to look at the use of knowledge about a student's learning style is through the eyes of the classroom teacher. David Kolb (1976a and 1976b), in his research with the Learning Style Inventory, suggests instructional methods that are appropriate for experiential learning. He also suggests how to use such assessments to facilitate experiential learning in classroom instruction. Roberts' (1977) work suggests that MTBI results can be used in the classroom to understand the differences between an instructor and the students when instruction is given. Roberts' recent research indicates preferred instructional modes and media can be established from the data collected from the MBTI. These two research projects move toward providing information to practitioners on matching learning styles with appropriate instructional settings.

Tom Clark (1976) at Empire State College presents a way to view the establishment of alternative modes for students in the classroom by offering a step-by-step plan the teacher can use for individualizing instruction. Although his model does not include assessment of learning styles, it can easily be adopted into step one of his format. The steps in his model are:

First Step—an individual needs analysis or inventory. The purpose of this exercise is to evoke answers from the student in regard to several aspects of learning activities. "Why are you taking this course?" is a typical question regarding the individual's purposes. "What is your preferred learning style" can be ascertained during this step.

Second Step—setting forth of an individual contract or plan that addresses the data collected from the inventory. The contract reflects these parts: purposes; outcomes; learning activities; educational process; demonstration of learning; methods, criteria, standards, and evidence to be employed in evaluation.

Third Step—sharing the individual plans with the classroom group. From this, a decision regarding the extent of the individualization can be made. A faculty member may decide that only some of the activities will be individualized. This step can be accomplished *if* steps 1 and 2 have been completed.

Clark points out that if this process is to be successful, the faculty member will have to play a series of roles.

These roles include knowledge/subject matter expert, information resource, linker, facilitator, and evaluator.

The combination of Kolb's LSI, the CSM, or the MBTI and Clark's contract model provides ways of implementing learning styles information in the classroom.

However, the impact on the individual teacher may be too great, since he or she provides individualized activities for the entire length of the course. Another difficulty may arise if the instructor is unable to play the five roles Clark indicates are essential to effective individualization of the educational process in a group context.

Institutional Approach to Learning Styles

Institutional Implementation and Its Implications—The approach to the use of learning style information at the institutional level is more complex than at the classroom level. There is little in the literature about how to organize an institution to offer alternative instructional paths when students' learning styles have been identified. More research is needed in this area, with particular attention to the appropriate roles administrators should play. Certain assumptions can be made about implementation.

What is found is that the design of the program of study, as well as appropriate administrative support that is student-centered and

offers ways of choosing learning modes, is multidimensional. There are a number of obstacles to any educational change. Allan K. Gaynor (1977) writes that "stability and change are but two faces of the same state of being. Stability has no practical meaning except in terms of adaptation, that is change." Gaynor says "we know more about diffusion and adoption of innovation among individuals, than we know about the implementation and institutionalization of innovation in complex organizations" (p. 235).

Bennis (1969) comments that "what we know least about and what continually vexes those of us who are vitally concerned with effective utilization of knowledge is *implementation*" (p. 59).

Rogers (1968) offers an answer after posing the question, "Why the complexity of organization?" Rogers' studies identify the types of individuals in the stages of change and suggest they can be labeled as innovators, early adopters, early majority, and laggers and resistors. Rogers points out that the values of all these groups within the organization must be understood when determining the organizational climate toward change. The resistors must be identified as well as the possible innovators, early adopters, and early majority in order to complete this assessment.

Lindquist (forthcoming), in his study of strategies for change, explains that the key to access to the formal decision-making system in an institution or organization is a person or group who can put the demand of an innovation or change on the authority's agenda. He refers to this person or group as a "gatekeeper." Gatekeepers that are supportive of an endeavor exhibit behaviors that encourage as well as guide a change in the system. Lindquist suggests an analysis of the people in the organization as a way to identify who will support/implement the change endeavor.

Studies on planning change indicate that the implementation and institutionalization of innovations in educational organizations require an analysis of groups within the organization and an indication of their perception of the change needed. The implication here is that an assessment of the extant organization, to determine organizational climate, is primary in supporting the learning styles endeavor and the first step in planning.

The research and literature on educational administration outline many procedures for assessing the organizational climate (Likert and Likert 1976; Halpin 1966; Stern 1970). These works need to be carefully studied so the leaders of such an endeavor can accomplish their objectives.

Where to Begin?—To institutionalize knowledge about student learning, some questions need to be answered to assure success:

- Should the implementation occur as a pilot project in a single department/division before expanding to other areas of the college?
- Should the implementation begin with the teaching faculty by developing, through in-service training or some other staff development approach, the capability of preparing alternative teaching methods for the various learning styles of students? Emphasis on implementing student assessment and subsequent advising would follow the development of alternative teaching methods.
- Should it begin with counselors who are trained to analyze and discuss learning-style instruments with students and who can assist them to adjust to whatever teaching style they may encounter? Alternative teaching styles would occur in the academic departments, as student demand and teacher acceptance are brought into focus.
- Should implementation begin by providing introductory workshops on the concept to the whole college staff on a voluntary basis? Then should services be provided throughout the college to support different ways to learn similar to the following?

(1) Provision of alternative teaching styles in the various instructional divisions;

(2) Provision of assistance in development of instructional materials through an educational development office, media center, or learning resources center;

(3) Administration of the student learning style assessment in a designated unit of the institution such as the counseling, testing, or learning resources center; and

(4) Interpretation of the student's style of learning and subsequent student advisement.

Suggestions for Establishing a Plan—Answers to these questions and subsequent actions can be categorized as the parts of the plan are pulled together. The first phase is to assess the present organizational climate, leadership styles, goals, decision-making system, and commitment of the institution and its members. Communication and the management systems require specific prior planning before moving to plans for each unit of the organization, and are adequately covered in the literature of educational administration and planned educational change. Planning the implementation system should include the following components:

- Curriculum Programming—Objectives of each program, course, and part of a course that identify outcomes for the student of the

learning process, and provide a plan for continuous progress in learning must be written and evaluated for appropriate sequences. Knowing his learning style will give the student and the teacher a tool for planning learning activities to meet these objectives, which are stated in terms of competencies.

• Learning/Teaching Format—Identification of possible ways for students to gain the competencies identified in the curriculum should be published for the student's information and decisionmaking. This sub-plan involves identification of a number of ways to learn each competence. Ideally, the ways to learn should include lectures, group activities, self-paced, student-controlled learning, and use of media hardware and software.

• Involvement of Staff in Preparation of Materials—A curriculum design written in clearly identified, measurable outcomes and alternative instructional modes requires a system of task assignments and workload limits within the staffing plan. Typed and duplicated course objectives that outline learning activities must be distributed in a uniform fashion. Questions to consider during this planning phase are: Who will decide when, where, and how to house these materials? Who will do the typing? Who will do the printing or duplicating? Who will decide what these materials should be? How will these materials be catalogued for easy access by students as well as faculty and staff members?

• Distribution of Materials—Questions to be considered are: Who will be in charge of the curriculum materials? Will the printed program information be sold to the students or distributed by the faculty, distributed by support staff, or at a central distribution point?

• Reorganization of Space—Most educational institutions have been built with large numbers of classroom spaces that will accommodate 30 to 40 students and tablet-arm chairs with a teacher's desk and chalkboards. Some of this space will need to be altered.

Space for teaching modes and strategies to accommodate different learning styles and appropriate support areas demands total facilities planning.

In detemining space needs the following descriptions of space should be considered:

(1) Testing areas.

(2) Independent Study—allow students to work independently without interaction with other students. Usually it is best that individualized study carrels be set up to accommodate this grouping arrangement.

(3) Seminar—this arrangement requires space for small groups of students to meet and discuss a particular topic. Conference tables and chairs are appropriate.

(4) Medium Group Instruction—space appropriate for lectures, film viewing, and other activities of between 30 and 40 students.

(5) Large Group Instruction—accommodations are needed for stage presentations and/or activities for 100 to 1,000 students.

(6) Conference—space needed for one-to-one interaction with teacher. This requires faculty office space.

- Fiscal Support—Program budgeting for academic changes are possible when operating budgets are built from yearly institutional objectives based on longer-range goals. Questions to consider are: What do we wish to accomplish this year in the light of the priorities we have? What fiscal support is required and available? What must we alter to accomplish these objectives?
- Staff Patterns—Should present positions in the functional hierarchy be changed to facilitate the accomplishment of the objectives? Can we use differentiated staffing patterns? Do we reorganize our present staffing patterns? Where will the counselors, librarians, and the media staff be placed to accomplish the objectives? Must clerical staff be reassigned? Will tutorial staff be needed? What is the total number of additional staff needed?
- Reorganizing the Schedule of the Institution—How will we design the time a student or faculty member has for teaching/learning activities? Consideration should be given to how much time is needed for students to achieve outcomes specified in the curriculum that has been redesigned.

> For many courses the semester time frame does not make sense for all students. Some learn faster than others, and, by mandating a set time to reach a specific goal, we have for years done a disservice to both our faster and our slower student. (Diamond 1975)

It is essential that we explore ways of changing the time required for an acceptable level of achievement and optimum results. Successful learning for all students does not happen in the same length of time nor in the same way.

Roberts (1973), in researching administrative functions for adapting an institution to alternative instructional approaches, suggests adopting modular scheduling as an alternative to the present lock-step system. Some students are unable to function successfully when they must keep up with a group that meets for three hours a week. A

schedule that offers more teacher-student time, flexible amounts of time to complete a course successfully, and an opportunity to recycle immediately when they cannot keep up with the work must be designed.

• Academic Advising—In each discipline within the academic program, the academic advisor will use the student's learning profile to determine, with the student, the best mode of study for that student. The major areas of concern and selection are the types of learning associations needed in the instructional setting.

If the learning style of the student is independent study, then he will be given a study guide and a syllabus. The dates of tests and other types of evaluation, where the student must be for evaluation, and the classroom lectures and other types of activities the teacher believes all students should attend will be indicated. In most disciplines, the student in independent study is required to report his progress to the teacher at stated intervals in the semester. When and where will this be done?

If the student's learning style is that of working with peers and in groups, he is given a schedule of seminars to attend and an explanation of how to use peer tutoring services. How will this information be organized and distributed for program advising?

If the student's learning style indicates that he needs a lot of structure and assistance with his study, he is scheduled with lecture sessions, tutorial assistance, and a structured program of study, including many sessions with the teacher and clear guidelines for study. Academic advising requires a total analysis of the present system in the institution.

• Reward System—Assess the present faculty and staff evaluation system to see if it rewards the tasks of the learning style approach. It has been estimated that except in a few leading institutions, 10 percent of the faculty account for 90 percent of all research and publication. This disparity can be reflected in most educational change endeavors. About the same small percentage of faculty are involved in educational change. The single most important factor keeping faculty from improving instruction was the *lack of time* due to other responsibilities; 20 percent said that their departments would not reward them for course improvement (Stakenas 1972).

Questions about the reward system are: How do we involve the faculty in establishing meaningful rewards for work in this institutional approach to learning styles? Can old systems of tenure and promotion be revised to reflect rewards for participation in the learning style endeavor? Can we use the MBO format? Can we use a type

of incentive system? The reward system of the institution must support this endeavor.

• Clerical Support Services—The impact on clerical support services can present a significant obstacle. Objectives for this component include:

(1) Increase the clerical support of the faculty in the use of learning styles and alternative modes of instruction.

(2) Increase the efficiency and effectiveness of the clerical/administrative support operations of the institution.

(3) Develop a personnel classification system, including career ladders, for the clerical staff related to the level of responsibility and duties assigned. Communicate to clerical staff their roles in supporting the learning styles endeavor. Tasks performed will be analyzed as a part of the reward and promotion system.

(4) Bring about cost reductions when feasible and appropriate. Analyze present support services. Consider the use of word processing systems that can facilitate a new reward and promotional system.

(5) Identify logistical arrangements, training, operation procedures, and equipment needed to accomplish the above listed objectives.

(6) Include the clerical group when devising the supportive reward systems of the institution and in the planning sessions of the learning style approach.

• Management Development—The leadership of the institution must have skills in both initiating new structures and in considering others' values, beliefs, and personal differences. Present structure, functions, and operations managed by an institution's staff affect the success of our new educational goal. The dimensions of implementation call for a systematic reorganization and training of the administrative team.

Management effectiveness is achieved by initiating a structure that supports the efforts of the faculty and the instructional support units of the learning styles effort. The leadership function is incumbent upon members of management when considering members' values, beliefs, and personal differences, as well as the initiating of new structures.

Four categories of data are relevant in this training phase. These are the student's learning styles, rate of learning, value system of the present members of the organization as a group, and consideration of the institution's present use of personnel, technology, space, and budgeting.

Additional considerations that the college administration should examine are:

(1) That a commitment to the learning style approach has an effect on the total educational setting. Implementing the supporting organizational structure for any approach to this endeavor will include changes in most of the following: faculty, budgeting, academic advisors, counselors, research staff, administrators, the college catalog, space for and technology for appropriate support in testing, student records, public relations and the student orientation, among others.

(2) That the training of faculty and staff is an institutional priority to effectively use learning style information regarding students and factulty. Orienting students to using knowledge about themselves seems to be paramount to ultimate success. The research at Oakland Community College indicates that administrators and staff should be aware of their own particular learning styles and the related impact on their institutional roles (Hill 1973). The use of learning style instruments mentioned earlier should be used to analyze present the administrative styles of the institution.

(3) That the analysis and restructuring of the institution's organizational structure and supportive resources be done through assessing and redesigning all the systems of the institution.

Program Coordination—Program coordination is another crucial phase of planning. Questions to be considered are:

(1) What levels in the institution are appropriate to consider for program leadership and coordination—for example, the normal administrative lines, a particular faculty member, staff members, counselor, ombudsman position, committee? What role the individual will play in the management scheme will be determined by the existing organizational structure and institutional context.

(2) What changes will have to be made in budgeting, academic advising, counseling, the college catalog, acquisition of additional equipment, student records, and student orientation?

It is important that the administrative team establish clear objectives and define structure and role to implement those objectives: administrative structure should reflect functional categories. The administrative team's responsibility is to implement the policy team's objectives. Thus, the management grid is designed by those who represent institutional functions. Functional units to be included are: leadership staff, teaching staff, classified support staff, instructional support staff, financial support staff, physical facilities staff, staff development team.

With structure defined and personnel identified, a planned integral communication program among the involved group is needed. A

reporting system must reflect, in sufficient detail, what is needed, what is going on, and benchmarks for accomplishment.

Each of the questions and ideas posed in this section will influence program implementation; however answers for one institution should not be applied to any other institution, no matter how similar in characteristics. Each institutional plan will be unique.

The following section will present some assumptions regarding the appropriate implementation system for the institution as a totality.

Assumptions: Implementation of the Institutional Approach

The eight assumptions presented here posit the requirements for considering the institutionalizing of the use of learning styles in the college setting. The authors have take it on themselves to present these assumptions in order to display the complexity of implementation for college administrators in this endeavor. The approach can be undertaken if the institution can accept undulatory movement toward long-ranged results.

Assumption 1—The reorganization of educational institutions depends on institutional subsystems.

Diamond (1975) indicates that academic reform of programs and alternative modes of instruction must be started with two assumptions: first, you cannot separate academic programs from the entire climate of the institution; and second, change will not happen by chance. Change requires top administrative support in word and action.

> It means proper support in time, talent, and money. You need dollars to hire faculty over a summer, you need the ability to buy and develop new materials, you need the support of the registrar, the head librarian; you need evaluation and development help. It means the establishment of a genuine rewards system and it requires the establishment of a formal unit to support and facilitate change. (Diamond 1975, pp. 84-85)

The implications of Diamond's statement seem to recommend the use of a contingency model. The focus here is on the compatibility of the organizations' functions as the implementation of curricula and instructional processes takes place. This means the focus is on the different learning styles of students as well as on the alternative instructional modes.

Assumption 2—To implement a plan using knowledge of learning styles, the systems approach should be used in the decision-making process.

A frequently stated maxim of the process of decision-making is

that those affected by the decision should be involved in making the decision. The predeliction of management is to adjust the appropriate decision-making roles to circumstances that surround the decisions. Seldom should the same method be used for all decisions. The method of decision-making should vary according to the type of decision, the amount of time and resources available, the nature of the overall task, and the members of the administration and staff involved. Consensus decision-making is the most desirable. It affords the advantage of producing an innovative, creative, and high-quality decision that elicits commitment by all members to implementing the decision. But it takes a great deal of time, psychological energy and a high level of member skills.

Therefore, the uses of systems analysis to determine an appropriate decision-making process should be considered only when the institutional climate and types of personalities involved in the requirements for change are well understood. Time pressures should be at a minimum and no emergency in process if the collaborative model of decision-making is used. The analysis of preferred leadership by the members may make the collaborative model unviable. Determining the organizational climate is the responsibility of the administrative team. Also the administrative leadership style will have much to do with the decision-making pattern set up to promote educational change.

Assumption 3—The best leadership style for implementing a learning styles plan is to develop an initiating structure that permits unbiased consideration of the plan.

Halpin (1966) has determined that there are two significant dimensions of perceived leadership behavior. The first dimension is initiative, which reflects the extent to which someone in a position of leadership is likely to define and structure his role and those of his subordinates towards goal attainment. A university administrator can play an active role in directing group activities through planning, coordinating, communicating, scheduling time, and trying out new ideas. The second dimension is consideration of others.

The Halpin instruments have indicated that in the educational setting the successful leader must be rated high on initiating structure *and* consideration of others (concern for individuals as individuals) in order to be viewed as an effective leader by his peers and the members of his group or institution.

Likert (1976) suggests there are four types of leaders: the exploitive authoritative, the benevolent authoritative, the consultative, and the

participative group. He postulates that the participative group is most appropriate for university and college decision-making structures (1976). Argyris and Schon (1977) identify Model I and Model II behaviors in educational organization. They assert that individuals are complex organisms that produce work energy for personal gain, which can be understood in terms of individual need. They maintain that individual needs are influenced by the organizational context. Model II behavior is exhibited by democratic consciousness, and is the most promising decision-making structure for the institution of higher learning.

Assumption 4—If the administrator's perception of the institution's members' values and beliefs is not accurate during the decision-making process, then the endeavor will fail.

The first principle is if change does not require an individual to violate traditional beliefs in the normative behavior patterns of the social system, then the adoption of the change becomes a personal decision; this means that teaching procedures and strategies as well as planning a course become arenas for change.

Another equally important principle is that if the change requires an individual to violate traditional beliefs, then the adoption of the change will be mediated through the social system; therefore, the social system becomes the object of change.

These two principles have implications for deciding where to begin, who will be involved, and whether or *not* to begin with a total institutional implementation. The question of how much faculty involvement can be answered only after the assessment of the organizational members' present norms and values and their attitudes toward instructional change.

Assumption 5—The faculty must be involved in institutional decisions about the use of learning styles.

The decision-making process can be described as a cycle of events by which an organization makes and implements decisions. If a decision is made to use knowledge of students' learning styles by offering alternative instructional modes, two approaches can be taken:

(1) The decision can be made on the basis of need and desirability.

(2) A decision can be made on the basis of the cost of the endeavor and the time investment of the members of the institution.

Comparisons can be made regarding the investment of institutional resources in a learning styles program relative to other functions. The process of allocating resources is determined by the selec-

tion of certain courses of action from among various alternatives; which courses of action are selected will be a function of the relative usefulness or value of the different alternatives. The ultimate criterion, then, for the decision is utility, value, or pay-off to the institution.

The literature on educational decision-making favors shared decision-making.

Likert and Likert (1976) postulate that applying the participative structure of leadership to the existing interaction-influence network of universities and their decision-making processes can bring about successful resolution of conflict among groups in an educational setting.

Questions for faculty regarding the use of student learning styles as a way of offering alternative instructional modes clearly fall outside of their zone of acceptance.

Simon (1947) assumes that teachers who make decisions outside of their zone of acceptance will insure more effective and less conflict-aggravating decision-making climates than when they are not asked to participate. The use of leadership behaviors described by Likert can be very effective if teachers meet the test of whether or not they can make meaningful contributions to the identification or solution of a problem. Implementation plans should include ways and means of using faculty in the decision-making process.

Assumption 6—System change for implementing use of knowledge regarding individual student learning requires a systems analysis and suggests the use of quantitative ways and means.

Most educators are not convinced that all educational problems are quantitative. Heavy emphasis on quantitative methods does not preclude the use of qualitative methods, since all educational administrative problems are not subject to quantitative approaches. Unfortunately, there is not yet widespread use of quantitative techniques to solve administrative problems. According to Banghart (1969), "this lack is the function of (1) the methods by which educational administrators are appointed and (2) the university training program for educational administrators." In spite of the infrequent use of systems techniques, they can provide the most useful tool for the approach to institutionalizing the learning style approach.

To bring about change, fiscal support must be present. Optimal allocation of resources means that the total system must be taken into consideration. In any systems study, it is imperative that the total system be considered. Use of systems design to determine the cost of the learning style plans of action are most helpful.

The following listing is a planning model to be considered as a format for implementing the use of knowledge about learning styles.

Systems Procedures—

(1) Need—specify where the organization is at present and needed changes.

(2) Objectives—establish objectives for the organization and its components. Specify staff, resources, time, and space needs in these objectives.

(3) Constraints—determine restrictions or limitations based on feedback information from needs assessment.

(4) Alternatives—select options for possible implementation.

(5) Selection—make choice of best alternative.

(6) Implementation—use the critical-path format and analysis for checking the appropriateness of the final plan.

(7) Evaluation—use milestone check-offs on evaluation statements of projected outcomes.

(8) Modification—recycling, deletions, or additions are an integral part of the systems' planning process. This is the feedback analysis.

Systems Modifications—Much of systems theory is based on the concept of internal monitoring and consequent modification of functions. The term "feedback" is inherent to communication when applying systems theory to the organization. To fully understand the application of feedback, one needs to be pragmatic. What interim outcomes and checkpoints should be be considered along the way? Monitoring the organizational climate through the informal feedback system as well as the formal hierarchial structure may better focus the attention of the administration on alternative paths to achieve the mission.

Consider the college organization. The innovation of ascertaining learning styles of students and placing students with teachers of similar styles of teaching causes significant change, and faculty may not be able to adjust to it. If the administration feels the force of negative faculty opinion and changes the mode of adoption to a sharing of the information regarding learning styles with the students (so he will have a self-profile) and the teacher (so that he will be better informed of his teaching style), the institution will have been regulated by the opinions of the faculty. All regulatory bodies such as boards, agencies, and government, are feedback control systems, and might also have to be considered as possible impingements on decisions about learning styles. There is obvious importance to maintaining good relations with them.

The analysis of faculty strengths while using learning styles informa-

tion is another example of the feedback system. Institutionalizing such a knowledge-base of learning styles for students, as well as for teachers of students, can present serious constraints on the practical and long-range application of knowledge about learning styles as well as the capability of the educational organization to support such an endeavor.

Systems Techniques as General Management Tools—Much of the literature on systems management focuses on operational procedures, such as network analysis, program budgeting, and operations research. The intent of these procedures is to maintain and improve the effectiveness of a system. It can be argued, then, that systems analysis and systems theory focus basically on methodology and concepts. The leadership skills needed for creating an instructional organization that incorporates the systems approach to identifying student's learning styles and the necessary instructional process of such an approach are those of adaptation and adeptness in dealing with diverse types of activities.

The use of the Cognitive Style Map at Oakland Community College represents the systems approach to educational methodology and was used as a tool of management as well as instruction. Hill and his associates, in designing the organizational approach to implementing the knowledge of learning styles, indicate that cognitive styles (learning styles) of individuals involved in teaching, counseling, and administration are very important for organization and structure. They provide a picture of the profiles that reflect the cognitive strength of the individual teacher, counselor, and administrator at Oakland Community College. The CSM is used for providing these profiles.

Administrative style has major and minor orientations representing four degrees of demeanor: (1) dominant, (2) adjustive, (3) cooperative, and (4) passive-custodial, as ascertained by the Cognitive Style Map. Major and minor orientations become the emphasis elements for selection of administrators for appropriate tasks in the organization. Hill and Nunnery's (1973) studies with the CSM indicate that persons, processes, and properties, along with major and minor orientations of symbolic modes, form profiles that portray the administrative style of an individual. The CSM characterizes various administrative styles. The dominant administrator reflects the "My goal, my way" approach. The adjustive administrator reflects the "My goals, your way" or "Your goals, my way" approaches. The cooperative administrator employs the demeanor of "Our goals, our way," while the passive-custodial demeanor is one resulting from a "Your goals, your

way" approach to administration. An analysis of the personality of administrators can provide a basis for determining appropriate roles and paths in the decision-making process when implementing institutional support of learning styles and the learning styles knowledge base.

Hill and Nunnery (1973) suggest that the selection of appropriate administrators and appropriate administrative styles and skills is essential to the success of any institutional change, particularly the support of institutionalizing learning styles knowledge. It is a phase of determining where the organization stands and a way of identifying appropriate data about the people in that organization. It is an integral part of using the systems approach as a management tool in a total planning design.

Within an educational setting, Hill and Nunnery have applied the systems approach to teaching style, administrative style, and counseling style. Using the CSM as the instrument in this process, his work has applied systems analysis to the educational system as well.

In the Hill and Nunnery model, accommodating the systems approach to knowledge of how a student learns requires the institution to provide support by using computers to diagnose a student's learning style, devising personal educational prescriptions for each student and reducing content of courses to unit size, and then monitoring student achievement through frequent testing.

The analysis of the organization and its position, the organizational climate, the types of leaders it has, the identification of the types, values, and beliefs of its members, and the use of systems theory in analysis, decision-making, and communication processes are integral parts of beginning the institutional approach to using the knowledge of students learning styles to change the present setting of educational endeavors. Such an approach is multidimensional and complex. There is no one right way. It is assumed that a well-planned communication network can facilitate change.

Assumption 7—No approach to instituting change in the organization will be of long-range consequence without communicating the institution's commitment.

An effective communications system involves all members of an institution. There are a wide array of organizational conditions to consider. Overlapping, interdependent work groups must be considered in the implementation phase. The planning process prior

to implementation must have an examining phase of possible impact on each group within the organizational structure.

The translation of the goal of assessing learning styles into concrete and specific new behaviors for staff members is absolutely essential to the success of the endeavor. Adoption is not tantamount to implementation. Verbal adoption is not enough. A new way of organizing and administering must be instilled and implemented. How should this new way be communication and by whom?

The Administrative Team—To successfully implement change involving the learning and teaching styles of students and teachers, the members of an organization responsible for the planning and implementation must be aware of the continuity of traditional and on-going patterns of behavior that typify the organization. This continuity is a strong force that can act as a barrier to the achievement of the proposed goal. How to mesh present policies with the new, desired policy requires administrative skills in communication strategies, political awareness, and management processes for implementing organizational structural change. Consider the necessary communication network that must be established for the administrative team.

Establishing Communication Channels—The communication channels listed below indicate a change of traditions of the administrative structure and activities of the management team. Setting priorities for the activities of administrators as well as every unit and its members within the organization is essential. Communication between and among units and individuals in units must include monitoring where they are, where they are going, and how they are going to get there using systems procedures. A typical communication cycle would be: president to board; president to administrative staff; administrative staff to support units; administration to faculty; faculty to administration/faculty to support units; faculty to students; support units to administrators; support units to faculty; students to faculty; administrators to president; board to president.

This stage in the implementation of the desired change may be elementary to most administrators. Banghart (1969) and others suggest that it is not. Planning must include global consideration of the possible impact on all elements of the organization. Lindquist (forthcoming), Simon (1947), and Likert and Likert (1976), among others, suggest this step is of great importance.

Assumption 8—Faculty need to feel a part of and have input to the innovation process of an institution.

Implementing Good Communications: Faculty and Administrators—A common mistake made by administrators is assuming that others know what the various support units of an institution are doing and can do to assist them. In reality, few faculty members understand the administrative structure of the organization or each unit's responsibilities and accessibility to the individual faculty member. Little is done to explain: roles at each level of institutional responsibility, policies and priorities, or the access of individual faculty members to the communications network. An effective communication program starts internally, with each department making sure that all members are communicating with each other. Often departmental objectives are unclear, even to the professionals themselves—if they do not know what each other is doing, then they cannot be expected to know what the rest of the institution is doing.

Establishing a new liaison advisory committee to each support department is one of the best ways to bring about understanding of the functions of the department and the expectations of the professionals it serves. Members of the advisory committee are also members of departments.

Most faculty and other staff members have little knowledge of the professional competence and activities of those outside their immediate domain. In-service training programs that show what an individual department is doing to achieve the objectives of their role in the institution's priorities should be considered as a possible activity to achieve viable communications within and among the groups.

Each department should have a part in the educational endeavor. This means each member of linking units knows each other, not only professionally but personally. Formal organization can incorporate nonteaching faculty into their departments. Rapport can be established through an informal structure of shared space, coffee and lunch, common areas, and time to develop solid working relationships. For example, if a counselor is part of the instructional team, rather than staffed and housed in the counseling centers, and knows the faculty of the unit personally, when the counselor is requested to intercede for a student with a problem involving an instructor, the tension is appreciably eased, since the instructor and counselor are colleagues and not merely names on office doors.

Faculty members need to feel a part of the institution's achievement as well as part of the progress along the way. Many administrators ignore their responsibility to account to faculty and to establish a procedure that allows faculty to report their status in the innovation process. All members need to communicate their progress

or the lack of it in achieving instructional methodologies that complement students learning styles, if long term accomplishment is the goal.

Workshops to explain the innovation is a good first step. But few administrators bother to report the process by which they arrived at objectives, determined constraints, and made their selection of the best approach given their particular circumstances. Such reports, of course, should be supported by concrete evidence, not generalities. The systems approach, using specific objectives and feedback procedures, provides such a vehicle for communication of this type. The president and his subordinates should insist all meetings and reports be supported by both quantitative and qualitative information (e.g., pecentage increase in retention, increased number of students mastering competencies of course or program, reiterating the commitment of the institution, problems and solutions that have occurred, etc.)

The phases of development and accomplishments of the learning style assessment program should be reported as they occur or at regularly scheduled intervals coordinated with evaluations (for example, at the end of a semester). The report should be fair and complete, reflecting problems and how they are being solved as well as successes. Everything should be backed up with data that are relevant, concrete, sufficient, and reported in plain English—not in the jargon of the pedagogy. The use of educational impact statements are appropriate here.

Thus, good communications among various and diverse units of an institution need an appropriate structure for such integration and diffusion. Each organization should assess its communication needs as well as the characteristics of its administrative personnel before designing its administrative model and before embarking on an educational change endeavor. There is no one management model that is universally appropriate. It is essential that the administrative team understand clearly who the team workers are and also what the specific team responsibilities are. This is part of the communication planning component. The problem-solving task assigned and the explicit parameters of the team's responsibilities must not only be known in advance by all team members, but also must be communicated with integrity to professional staff members.

Conclusions

In Part II we have considered the use of the knowledge of learning styles from three perspectives: that of the student, of the classroom teacher, and of the institution as a whole. All are multidimensional.

The institutional approach is complex and requires much time, cost, and frustration. The student and teacher perspectives are less difficult to implement. No matter which approach is used, there will be substantial impact on every part of the institution.

It should be remembered that existing interactions and influencing networks within colleges and universities have traditionally been loosely joined federations. Within educational organizations, these federations act as barriers to total system change and create a climate for conflicts rather than supportive, democratic structures. What is needed are educational administrators and leaders with the skill to develop linkages by using knowledge of learning styles as a framework for educational change.

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